REAL OPTIONS IN SEQUENTIAL STOCK ACQUISITIONS

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My dissertation seeks to address ambiguities in the common usage of real options as the counterpart of financial options in management, focusing on a specific management context: sequential acquisitions of equity stock. Despite its popularity, the metaphoric use of real options on sequential acquisitions brings up critical ambiguities, which might not be congruent with assumptions in the finance options literature. I seek to examine such ambiguities and align them with the theory and practice of strategic management. The dissertation is structured as follows: In Essay 1, I first identify key ambiguities in the metaphoric use of real options as a reflection of finance options in several management contexts, and then focus on addressing two key ambiguities in equity partnerships. Further, I provide the baseline framework to address the ambiguities, leading to the view of "dual latent options - dual partner roles." Finally, I propose three future research questions worth examining. In Essay 2, I address one of the three questions suggested in Essay 1: *what conditions enable a particular equity partner in an international equity partnership, to exercise its call by acquisition (exercise its put option by divestment) upon favorable (unfavorable) market shock?* Suggesting that the organizational capability to perceive external environments serves as an important contingency, I argue that the partner who can more significantly reduce its perceptual uncertainty will exercise an option aligned with the direction of the market shock. By extending this logic to international equity partnerships, I hypothesize about how a foreign partner's equity purchase (which coincides with local partner's equity divestment) is influenced by environment shocks. I conduct a regression analysis with a longitudinal dataset of international equity partnerships in the automotive component industry, and obtain results supportive of the hypotheses. In conclusion, my dissertation contributes to nudging the real options view from its current form, which is the largely metaphoric use of finance options, toward a "management theory" that is more consistent with the realities of strategic management.

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PREFACE

I sincerely appreciate the support of many people who helped me to complete this dissertation. Above all, I express my deepest thanks to Ravi Madhavan, dissertation committee chair, for his gracious support and mentoring. I also truly appreciate the four committee-members: Jeff Reuer provided me with insightful comments on positioning of my thesis, theoretical development, and many other aspects. Kevin Kim gave me very useful comments on the methodology. John Prescott and Susan Cohen, both of whom are my great mentors at the University of Pittsburgh, gave critical insights on many parts of the thesis.

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Ⅰ. INTRODUCTION

The development of the real options view has begun to have a huge impact on management research. Scholars have applied the real options framework to various aspects of management (see, Li, James, Madhavan, & Mahoney, 2007, for a review). At the same time, the use of real options primarily as a metaphor imported "as is" from finance options dominates the field: When decision makers, considering irreversible investments in presence of uncertainty, take an action which provides them with flexibility for future changes, this flexibility resides in real options.

Valuable though such a 'metaphoric' use of real options is, the common usage of real options as the counterpart of financial options in management may need to be updated. Although real options in management clearly draw from the theory of financial options (Myers, 1984), they also involve several crucial ambiguities, which potentially violate key assumptions that are salient in finance options. Such ambiguities might not only create theoretical problems in applying options theory to management but also mislead in terms of managerial implications. Therefore, the metaphoric use of real options should be more carefully understood and extended to align with the management realities.

The main purpose of my dissertation is to respond to such a need to bridge finance options and real options in a specific management context: sequential acquisitions of equity stock between partners. I define "sequential stock acquisition" as an acquirer's sequential purchase of part of a target firm's equity stocks, as distinct from the "outright complete acquisition" case where an acquirer purchases 100 percent of a target's equity stock in a single transaction. An equity partnership (such as joint venture) followed by a complete acquisition is an example of sequential stock acquisition. Since Kogut's (1991) seminal work, researchers have

suggested that equity partnerships are options for future full acquisitions of a target. However, as discussed in Essay1, the metaphoric use of real options on sequential acquisitions brings up critical ambiguities, which might not be congruent with assumptions in the finance options literature. I seek to examine the ambiguities of the real options logic in sequential acquisitions and align them with the theory and practice of strategic management.

My dissertation consists of two essays and one appendix. Each is structured as follows:

Essay 1: I first identify key ambiguities in the metaphoric use of real options as a reflection of finance options in several management contexts, and then focus on addressing two key ambiguities in equity partnerships. Further, I provide the baseline framework to address the ambiguities, leading to the view of "dual latent options - dual partner roles." The baseline framework approach differs from approaches by the extant studies: rather than setting theoretical/empirical boundaries (Adner & Levinthal, 2004; Cuypers & Martin, 2006) or addressing assumptions (Barnett, 2008), this approach admits fundamental ambiguities of real options logic as inherent to the nature of that logic and aligns those ambiguities with management reality. Finally, I propose three future research questions worth examining. In sum, this essay contributes to nudging the real options view from its current form, which is the largely metaphoric use of finance options, toward a "management theory" that is more consistent with the realities of strategic management.

Essay 2: I then address one of the three questions suggested in Essay 1: *what conditions enable a particular equity partner in an international equity partnership, to exercise its call by acquisition (exercise its put option by divestment) upon favorable (unfavorable) market shock?* To address this puzzle, I suggest that the organizational capability to perceive external environments serves as an important contingency (Milliken, 1987; 1990). I argue that the partner who can more

significantly reduce its perceptual uncertainty will exercise an option aligned with the direction of the market shock. By extending this logic to international equity partnerships, I hypothesize about how a foreign partner's equity purchase (which coincides with local partner's equity divestment) is influenced by environment shocks. I conduct a regression analysis with a longitudinal dataset of international equity partnerships in the automotive component industry, and obtain results supportive of the hypotheses. In sum, Essay 2 addresses one of the key questions suggested in Essay 1, and thus contributes to the literature as an initial step to address ambiguities residing in metaphoric real options in management.

Appendix: The data employed in the empirical analysis of Essay 2 are described in charts.

Ⅱ. ESSAY 1:
Beyond Metaphoric Real Options in Management

ABSTRACT

Despite its popularity, the metaphoric use of real options imported "as is" from finance options leaves critical ambiguities in its fundamental logic. This article first identifies several ambiguities in the use of real options in key management contexts. It then focuses on addressing two important ambiguities residing in equity partnerships: type of options and partner's role as an option holder/writer. Specifically, it emphasizes a baseline framework of "dual latent options and dual partner roles" to understand equity partnerships. Several future research questions are discussed based on the framework.

INTRODUCTION

The development of real options view has begun to have a significant impact on strategic management research (Li, James, Madhavan, & Mahoney, 2007, for a review). Scholars have applied the real options framework to various aspects of strategic management, e.g. entry timing (Folta & O'Brien, 2004), international investments (Reuer & Leiblein, 2000; Tong & Reuer, 2007), venture capital investments (Hurry, Miller, & Bowman, 1992), entrepreneurship (Lee, Peng, & Barney, 2007), R&D investments (McGrath & Nerker, 2004), and equity partnerships (see Table 2 for a list of extant works in this domain). The use of real options as a metaphor, or a reasoning tool, dominates the field (Barnett, 2008): When decision makers, considering irreversible investments in presence of uncertainty, take an action which provides them with flexibility for future changes, this flexibility resides in real options. Thus, there appears to be a consensus that such a 'metaphoric use' of the real options logic is useful in understanding flexible decision making in uncertain business environments.

Valuable though such a metaphoric use of real options is, the time may be right to address gaps in metaphoric real options as the counterpart of financial options in management.

Although real options clearly draw from the theory of financial options (Myers, 1984), real options involve some crucial distinctions which potentially violate key assumptions that are salient in finance options (Folta & Miller, 2002). Such gaps might not only create theoretical problems in applying options theory to management but might also mislead in terms of managerial implications (Janney & Dess, 2004). Scholars have addressed the gaps in two directions: one direction is to set theoretical boundaries in which real options logic works or does not work (Adner & Levinthal, 2004; Cuypers & Martin, 2006). The other direction is to modify assumptions implied in real options logic, such as rationality of decision makers (e.g. Miller, 2002; Barnett, 2008). Despite such efforts, there still remains room to address gaps in metaphoric real options.

The present article contributes to this stream of the literature by taking a different approach, i.e. addressing ambiguities of real options in specific management contexts. In applying metaphoric real options logic to various aspects of management, scholars implicitly or explicitly embed ambiguities in their fundamental logic which are fully specified in finance option. Among several management contexts, this study focuses on equity partnerships. The real options view has become popular especially in the equity partnerships literature, or the broad alliance literature, as it suggests that the value residing in equity partnerships is related to dynamic ownership structure changes between partners. Since Kogut's (1991) seminal work, researchers have suggested that equity partnerships (e.g. joint ventures, minority investments) are options for future full acquisition of a target or options for future full equity divestments.[1] However, any equity partnerships leave room for *ex post* negotiation for partners, which makes (1) type of options and (2) role of partners as option holder/writer unspecified *ex ante*. This is a

[1] In this study, equity alliances are defined to include joint ventures, which are legally independently established firms invested in by two firms, and minority investments where cooperative contracts are supplemented by equity investments by one partner in other partner.

critical divergence from assumptions in the finance options theory, which provides clear specifications for the above two elements. The *ex ante* lack of specificities in management options would complicate intermingling between options and between partners, in particular at the option exercise stage. Upon an equity shift from a partner A to a partner B (i.e. A divests equities and B acquires equities), for example, could such a shift be recognized as call option exercise of partner B, or put option exercise of partner A? Furthermore, when an environment positive shock emerges (Kogut, 1991), is it reasonable that *both* partners simultaneously exercise call options to appropriate enhanced option values (Tong & Reuer, 2007)? One may attribute mixed results in the extant empirical research to a paucity of understanding of ambiguities in real options in management (e.g. Folta & Miller, 2002; Kumar, 2005). This article seeks to fill the gap.

This article first identifies key ambiguities in the metaphoric use of real options as a reflection of finance options in several management contexts, and then focuses on addressing two key ambiguities in equity partnerships. Further, it provides the baseline framework to compromise the ambiguities, entitled the view of "dual latent options - dual partner roles." The baseline framework approach differs from approaches by the extant studies: rather than setting theoretical/empirical boundaries (Adner & Levinthal, 2004; Cuypers & Martin, 2006) or addressing assumptions (Barnett, 2008), this approach admits fundamental ambiguities of real options logic as inherent to the nature of that logic and aligns the ambiguities with management reality. In other words, this approach provides the perspective of how we can more exactly *interpret* the dynamics of equity alliances through the real options view, without losing the usefulness of this view. Finally, it proposes several future research questions worth examining.

In sum, this study contributes to developing the current form of a real options view, which is somewhat metaphoric of finance options, toward the management "theory".

AMBIGUITIES OF METAPHORIC USE OF REAL OPTIONS

Despite its popularity and usefulness for understanding a firm's optimal decision making under uncertainty (Bowman & Hurry, 1993; Kogut & Kulatilaka, 2001), real options in management entail fundamental ambiguities as a reflection of finance options. I first review the main structure of finance options transaction, focusing on a call option: The holder of the options contract (e.g. individual or corporate investors) has the right, but not the obligation, to exercise the call option, which involves buying the underlying asset at the specified price (strike premium). The writer of the options contract (e.g. financial institution) has the obligation to honor the holder's exercise decision. Thus, only the holder holds the option—in the sense of a right but not an obligation—while the writer is obliged to honor the exercise of the option. Further, the option holder pays the price of the option (option premium) to the option writer when s(he) purchases the option. Once the contract is initiated, both parties simply follow the rule on the contract. At the expiration date of the option (in case of a European option), the holder can decide whether or not to exercise, or strike, the call option. In general, she exercises the call option when the current value of the underlying asset exceeds the sum of the striking price and the option premium. As the strike price is specified *ex ante* on the contract, the threshold for option exercise is also obvious *ex ante*. During the option exercise stage, no additional negotiation is permitted. In sum, in finance options, all key attributes are *ex ante* specified. Further, *ex post* negotiation is not allowed and the option is proprietary for the option holder as long as she does not want to sell it to the third party.

In contrast, real options involve tremendous ambiguities in this regard. Table 1-1 summarizes key ambiguities in real options in several situations in comparison with finance options. Below I briefly describe them.

(1) *Ex Post* Negotiation In finance option, an explicit contract binds the degree of freedom of *ex post* negotiation between option holder and option writer. In contrast, *ex post* negotiation is often possible in management. This is because many real options transactions contracts do not involve explicit option clauses that can limit *ex post* negotiation among partners (Tong & Reuer, 2005; Vaossolo, Anand & Folta, 2004).

(2) Role of Players In finance option, it is explicitly specified *ex ante* who has a right to exercise the option as an option holder and who should honor the option holder's decision as an option writer. In case of real options in equity partnerships, for example, this distinction is ambiguous. All partners involved in a partnership potentially have a right to exercise both options.

(3) Type of Options What type of option a partner holds is ambiguous in equity partnerships. Through *ex post* negotiation, each partner still has the chance both to acquire a target and to divest its equity stakes.

(4) Proprietary Nature In finance option, the option holder enjoys the right to hold and exercise the option proprietarily. In case of real options, however, the option could be appropriated by others. For example, the options residing in a venture capital firm's investments in a portfolio firm might be appropriated, especially when the venture capital firm is not the leading investor.

(5) Cost to Purchase/Hold Options The finance literature argues that 'option premium' of financial option is defined as a stock price that an option buyer pays to an option seller and should reflect the value residing in the options. In other words, this is the extra cost to secure 'flexibility.' In case of real options in equity partnerships, however, premium for controlling the

management of a target should also be an important concern (Jarreal, Brickley & Netter, 1980). Furthermore, holding switching options by investing in multiple countries might incur coordination costs in operating them (Tong & Reuer, 2007).

(6) Cost to Strike Options The strike (exercise) price in real options is not specified *ex ante* unless an explicit option clause specifies it (Reuer & Tong, 2007). In equity partnerships, however, there is substantial anecdotal evidence that strike prices (deal values paid by acquirers to target in additionally buying targets' equity stakes) diverge substantially from initial prices (deal values paid by acquirers in first buying a part of target's equity stakes). Also, in case of market entry decision, the exercise of option deferral by entering the market might involve latecomer disadvantages. For example, the market might be already occupied by competitors when the late comer firm enters.

It should be emphasized that each of the above management contexts does not necessarily involve ambiguities in all aspects. In venture capital investments, for example, most key attributes are specified *ex ante*. Real options in venture capital investments thus involve fewer ambiguities, and their nature may be closer to that of finance options. In contrast, real options in equity partnerships involve many ambiguities, as will be discussed in the next section.

REAL OPTIONS VIEW IN EQUITY PARTNERSHIPS

Review of Real Options Logic in Equity Partnerships

Recent work on real options has provided rich insights, highlighting its relevance to dynamics of equity partnerships (see, Table 1-2). It emphasizes the value created by employing equity partnerships as a transitory investment structure toward acquisition or divestment in the presence of uncertainty. The real options view has contributed to the broad alliance/partnership literature in three important ways: first, it provides an alterative explanation of firms' motivation

to enter equity partnerships, complementing conventional theories such as transaction cost economics (e.g., Oxley, 1997), resource based-view (e.g., Eisenhardt & Schoonhoven, 1996), and so on. Second, it emphasizes the value residing in equity partnerships in the presence of uncertainty, while other theories tend to see uncertainty as a risk. Finally, it accounts for overtime change of ownership structure in equity partnerships. It thus serves to bridging equity partnerships and corporate acquisitions/divestments, each of which had been understood as a distinct form of corporate governance.

The main logic of real options involves two stages: inception stage and exercise stage (Folta, 1998). The *call* options logic in equity partnership is summarized as follows: at the inception of a partnership, by investing in a partial equity stake of a partnership rather than fully acquiring a target, a firm obtains call options to buy out its partner in the future. This means that the firm is conferred the right, but not the obligation, to undertake the specified action (i.e., additional equity purchase) in the future (Bowman & Hurry, 1993; McGrath, 1997). Subsequently, at the exercise stage, firms can sequentially decide whether they want to exercise the call option by buying additional equity stakes of the partner. The exercise of the call option will be triggered when the option value exceeds the value of holding options. Thus, the decision of additional equity stake purchase is substantially influenced by variables relevant to underlying assets and option values. This article focuses on the two important determinants: the value of underlying assets, and uncertainty. The condition under which a partner exercises its call option is expressed as follows:

$$S - C\,(S,\ \sigma) > P \qquad (1)$$

where S corresponds to the value of the underlying partnership, C denotes the value of holding options, σ is the uncertainty of the partnership value, and P is the exercise price. First, the above

inequality suggests that the increasing value of the focal partnership (*S*) would increase the likelihood of call option exercise. Kogut (1991) in particular relates this to the positive market deviation from the baseline trend as an external environment "shock". He argues that changes in the value of assets depend on the stochastic process determining the current value of embedded options. The market demand serves as a key cue to influence the value of embedded options. Further, market cues informing managerial decision are oriented toward identifying biases in the interpretation of market information: When the market cues signal a rise in market valuation relative to its baseline forecasts, a firm realizes a rise in the value of its assets, thus exercises its call options by acquiring additional equity stakes of the partner. Accordingly, the positive deviation from the baseline market trend would facilitate acquisition decision. Second, the *mitigation* of the uncertainty of the partnership value increases the likelihood of call option exercise. Greater uncertainty tends to delay irreversible investment decisions (McDonald & Siegel, 1986). In contrast, when decision makers' level of uncertainty decreases, and the value of their firm's options has increased, they would likely exercise call options.

The *put option* logic is also valid in the real option literature (Amram & Kukatilata, 1999; Chi, 2000; Kumar, 2005). The put option is a firm's right, but not obligation, to wholly divest the asset in the future. Under high environmental uncertainties, by forming equity partnerships, firms defer their commitment to a full divestment of the venture. Once the decision makers confirm that the holding ventures are worthless, they could sell out their remaining equity stakes of ventures to the partners. Thus, equity partnerships as put options help firms reduce the risk of regret at up-side environmental change while retaining the flexibility of divestment at downside environmental change. The market deviation from the long-term trend and the degree of uncertainty also influences the exercise of put options. When the market cue *negatively* deviates

from a long-term trend, the value of underlying asse decreases, thus prompting decision makers to exercise a partner's put options by divesting its equity stakes to its counterpart. Likewise, mitigation of uncertainty would facilitate the put option exercise decision. When the uncertainty is mitigated and the value of an underlying asset proves not worth holding, a firm would exercise its put option.

It should be emphasized here that the real options logic suggested above differs from an explicit option clause in equity partnerships. Equity partnership contracts sometimes involve explicit option clauses that can limit *ex post* negotiation among partners (Tong & Reuer, 2005; Vaossolo et al. 2004). In the contract, firms stipulate the clause that only one partner has a right to acquire its partner's equity stake (or divest its own equity stake) at a specified price in the future. In such cases, the degree of flexibility for partners' *ex post* behaviors might be limited. However, this distinction does not mean that equity partnerships without explicit option clauses do not embed options. Rather, *latent options* are embedded in any types of equity partnerships when they provide flexibilities for their future decisions in the contingent fashion. Indeed, Kogut (1991) argues, "The legal clause outlining acquisition rights should not be confused with the real option itself. (Snip). Joint ventures are real options, not in terms of the legal assignation of contingent rights, but, like many other investments, in terms of the economic opportunities to expand and grow in the future" (pp.21). Furthermore, there exists a sound reason that latent options may be more important than explicit options in equity partnerships. First, most equity partnership contracts do not contain an explicit option clause and leave it up to partners to decide through *ex post* negotiation about whether, when, and who can acquire the other's stake (Kogut, 1991; Chi & Seth, 2002). Reuer & Tong (2005) calculated the percentage of international joint ventures with explicit option clause of their sample from the SDC database, and found that the

figure is only about 1%. Second, partners can renegotiate their contracts after the inception even with explicit option clauses. For example, they could revise the contract or even terminate it through *ex post* negotiations (Reuer & Arino, 2002). In conclusion, unless the cost of negotiating such an acquisition or divestment *ex post* is prohibitively high, latent options can reside in most equity partnerships, and they essentially allow partners to *ex post* negotiate directly.

In sum, one could summarize the stylized assertions of the real options in equity partnerships as follows: (1) Equity partnerships serve as a latent call options or latent put options, (2) Latent options are in general embedded in *any* type of equity partnership, (3) Deviation of an environment from the baseline trend triggers option exercise decisions, (4) Resolution of environmental uncertainty triggers option exercise decisions.

The empirical studies of equity partnerships have provided mixed results, especially in accounting for option exercise decisions. To my knowledge, four studies in management have empirically examined call option exercises in equity partnerships. Kogut (1991) found that unexpected market growth increases the likelihood of partner buyouts. Folta and Miller (2002) examined whether a firm's decision of additional equity purchases is not always influenced by factors consistent with call option logic. Warner et al. (2006) found that the timings of firm acquisitions in technology industries are well explained by call option logic. Kumar (2005) found that firms, which additionally acquire partners' equity stakes for expansion purposes, do not create extra value, though they do not decrease their value. In addition to the above research stream on option exercises, Folta (1998) examined a firm's entry mode decision (i.e. initial stage) basing his argument on call options reasoning. Tong, Reuer & Peng (2008) examined factors for option values in international joint ventures. Reuer & Tong (2005), combining the transaction cost argument with the real option logic, posit that explicit call option clauses are

contractual safeguards that partners can negotiate into their joint venture contracts. Finally, Reuer & Tong (forthcoming) found that firms more likely enter into minority investments in newly IPO firms that have the larger value of growth options.

Two Critical Ambiguities

As discussed, real options in management inherently entail latent natures. At the same time, latent real options involve critical ambiguities. Below I discuss in particular two of the key ambiguities.

Ambiguity 1. Type of Options As far as latent options hold, whether one partner holds a call option or a put option *per se* is not determined *ex ante*. This is because latent options cannot bind firms' subsequent actions to equity acquisitions or to equity divestments. For example, when a firm incepts the equity partnership in seeking future acquisition of the partner, the firm would be recognized to buy the call option. However, it could simultaneously seek opportunities to divest its equity stakes to the partner when it realizes that holding the equity stakes would not have a positive impact on the venture. If the benefit of selling out its equity stakes to the partner exceeds the cost of holding them, there is fair reason to divest them rather than to "wait and see." Alternatively, a firm seeking to divest its venture might accept minority investment under high environmental uncertainties. In this case, it is recognized that the firm buys the put option for the future full divestment. Once the environment turns to substantial improvement (positive shock), however, there might emerge a sound reason for the firm to buy back the equity stakes from the investing partner. This possibility could be strengthened when the firms transfer technologies or knowledge through partnerships. For example, if the firm which sought the future divestment has assimilated, from the investing partner, the knowledge necessary to revitalize the venture, then the transferred knowledge might enhance the value of the focal venture for the firm and make it

prefer to manage the venture by itself rather than sellout. It would then seek opportunities to buy back its equity stakes which it had once divested to the partner, especially when the environment proves more favorable and holding ventures prove valuable.

Ambiguity 2. Partner Role as Option Holder/Writer In case of latent options in equity partnerships, it is not explicitly specified *ex ante* who has a right to exercise the option as an option holder. All partners potentially have a right to exercise options. For example, *both* partners in the equity partnerships have potential incentives to exercise latent call options (acquisition of the partner's equity stake) upon the increase of the value of underlying assets (S in equation (1)), which might be triggered by positive environment shock. Therefore, a partner's gains from expansion, or call option exercise, may be appropriated by its counterpart because the counterpart may also appreciate the businesses' enhanced value (Reuer & Tong, 2007). As far as there remains a possibility of upside gain, both partners could seek opportunities to exploit this upside swing. Similarly, both partners have potential incentives to exercise put options (divestment of their own stake to the other partner) upon downside shock in the business environment. The gains from divestment, or put option exercise, may be appropriated by either partner who may also seek to sell out the businesses. Therefore, both partners in the dyadic equity partnerships could potentially play a role of option holder who can *ex post* claim the right of option exercise.

Table 1-2 summarizes the prior studies on equity partnerships in regard to the two ambiguities. As the table suggests, many of the extant works implicitly embed the ambiguities in their theoretical logics without addressing them explicitly. This tendency is particularly salient for the empirical studies.

BASELINE FRAMEWORK OF LATENT OPTIONS

Dual Latent Options and Dual Partner Roles

Given the ambiguities in equity partnerships, a sound compromise might be to incorporate the *ex ante* un-specificities as inherent natures of metaphoric real options. Thus, the following baseline framework of dual latent options and dual partner role is proposed: First, in at the inception of an equity partnership of two partners, both partners should be assumed to hold both a latent call option and a latent put option simultaneously. Unless the cost of negotiating such an acquisition or a divestment *ex post* is prohibitively high—as is possible in the case of an explicit financial option transaction—both partners in general have the latent options to acquire and divest. Otherwise, under the assumption that each party is bound exclusively to either a call option or a put option, there would be no explanation for why a firm can acquire its partner's equity stakes upon environmental improvement or divest its own equity stake upon environmental deterioration. This article terms this interpretation "dual latent options." This reasoning dissolves the conflict between the argument of Kogut (1991) and the real cases. Kogut (1991), who follows merely the call option views, argues that because the invested equity is non-salvageable, the firm can neither divest nor acquire its equity when the negative market shock emerges. Kogut (1991) relies only on call option logic, thus neglecting the possibility that a firm could hold put options as well as call options in the partnership. However, this is not always the case in reality. There are actually plenty of examples in which acquisition (divestment for the partner) occurs in response to negative environment shock. For example, in 2005, Daimler Chrysler acquired the whole remaining equity stakes of their venture of truck manufacturing in Japan from Mitsubishi Motors, when the Japanese and Asian truck industry proved increasingly stagnant.

Lemma 1: At the inception of equity alliances between two partners, both partners hold latent call options and latent put options ex ante.

Second, it should be assumed that both partners *ex ante* have a right to play a role of option holder as well as option writer in the future. Unless the explicit option binds the ex post behavior of particular partners and the costs to revise the contract is prohibitively high, both partners have opportunities to additionally acquire or divest equity stakes *ex post*. This suggests that, unlike finance options, the role of writer/holder of latent real options in equity partnerships is revealed only at the option exercise stage. This study terms this interpretation "dual partner-roles." This finding shows a significant departure from the extant empirical studies that implicitly assume only one partner between the two can play a role of option holder (Folta & Miller, 2002; Kumar, 2005). In many cases, a partner who seeks to exercise call (put) options might face a challenge by its equity counterpart who also seeks to appropriate the enhanced (deteriorated) option values. For example, in 1997 when Wal-Mart acquired the remaining 33.5% equity shares in the joint venture with Cifra, a Mexican local retail giant, Wal-Mart had to pay US $12million for the additional purchases because Cifra sought to appropriate the enhanced value of the joint venture.

Lemma 2: At the inception of equity partnerships by two partners, both partners have rights to play the role of both option holder and option writer ex post.

Some extant theoretical studies, implicitly or explicitly, take views or assumptions similar to the framework of dual option and dual partner role: in particular, Tailan Chi and his

coauthors have specified that call options and put options coexist in both equity partners. Chi and McGuire (1996) build a game theoretical model of international joint ventures. Their model assumes that one partner might hold explicit contract clauses of both call option and put option. Chi (2000) theoretically investigates conditions in which option value to acquire or to divest between partners becomes higher. In their study on how specified option clauses are motivated by partners and how they involve economic implications for partners, Chi and Seth (2002) argue that "the two parties in general both have the option to acquire or divest (74)". In contrast, the extant empirical works do not well incorporate such dual options & dual partners' role perspective. Although Kogut (1991) suggests that a call option exercise reflects termination of equity partnership by acquisition, the study does not address which partner, between the two, acquires its counterpart's equity and which divests its equity to the counterpart. Similarly, Folta and Miller (2002) focus on call option exercise decisions of biotechnology firms investing into minority investments but do not incorporate the possibility that the firms also have put options, and that their counterparts have options. Kumar (2005) examined whether equity acquisition or divestments between partners create values, but regarded each acquisition or divestment as a distinctive event. In other words, it is not incorporated that an equity shift between two partners reflects acquisition for one partner and divestment for the other. Accordingly, this article complements the conceptual works by Tailan Chi and his co-authors by more explicitly suggesting it important to recognize the implicit assumptions of dual options and dual partners' roles. Kumar (2005) offers probably the most straightforward baseline framework to compromise the ambiguities in metaphoric use of real options.

Asymmetric Option Exercise at External Environment Change

Given that dual latent options and dual partner framework exist at the initial stage, this study will now address how the exercise stage should be understood. For simplicity, hereafter, this article limits uncertainties of our discussion to external environment. The external uncertainty is that of the external environment surrounding organizations. It is largely unaffected by firms' action whereas internal environment is largely affected by firms' actions (Folta, 1998). The external environment/uncertainty includes the nature of market growth, exchange rate, and political turmoil of the country, and so on. When an external environment shock emerges, equity partners may have to decide on option exercise or may continue to "wait and see" (Kogut, 1991). Because it is external and unaffected by a partner's action, the favorable (or positive) external environment shock, by its nature, increases the value of focal equity partnerships for all partners interested in the partnership, all other things being equal. In contrast, unfavorable (or negative) external environment shock decreases the value of the partnership for all partners. Therefore, in a favorable external environment (such as radical market growth from baseline trend), both partners could seek opportunities of call options exercise or intended acquisition because both would appropriate positive gains from the improved environment. Inversely, upon an unfavorable event (such as radical market shrink), both partners could seek opportunities of put options exercise or intended divestment.

With dual partner roles, both parties hold the rights to exercise call options in a favorable change of environments. Therefore, the actual shift of equity stakes between two partners upon favorable environmental shock means that only one party, who actually purchases its partner's equity stakes, exercises its call option whereas the other partner, who actually sells its equity stakes to the purchasing partner, simply agrees with the deal despite having the right to exercise call option. It is noteworthy that the selling partner upon favorable environment change does not

exercise the put option, but simply honors the purchasing party's call option exercise—i.e., the selling partner is acting as the writer of the buying partner's call option contract. Presumably, the selling partner could have attempted to exercise the call option, but gave up its exercise chances simply because its benefit from selling its equity stake exceeds the cost of holding equity stakes and the cost of exercising the call options. This holds for the opposite direction as well. When one party sells its equity stakes and the other party acquires them during an unexpected, unfavorable shift in the environment, both partners could have incentives to exercise put options. Therefore, a partner who actually sells its equity stakes does exercise put option whereas a partner who actually purchases them is playing the role of writer of the options contract. In sum, the relationship between one partner's acquiring its counterpart's equity stakes and selling its own equity stakes is not symmetric in the sense of two partners exercising call and put options, respectively. When one partner initiates its call option exercise by acquiring the stakes, the other partner simply gives up its option exercise and honors the deal. When one partner exercises its put option by divesting its own stakes, the other partner simply gives up its right of option exercise and honors the deal.

Lemma 3:Upon equity shift between partners under favorable (unfavorable) external environment shock, one partner exercises its call (put) option but the other partner plays the role of writer of the contract—i.e., honoring the other partner's option exercise.

RESEARCH QUESTIONS

While the baseline framework of "dual latent options & dual partner roles" serves to provide a more precise and intuitive understanding of equity partnership dynamics, it also

provokes intriguing research questions for future studies. Below, three of these research questions are briefly discussed; however, questions should not be limited to the three included below.

Research Question 1. Which partner exercises an option? This article's baseline framework naturally leads to the following research question: *which partner, between the two, exercises an option aligned with the direction of market shock?* As previously discussed, within the framework, only one partner between the two can appropriate improved (deteriorated) option values under favorable (unfavorable) market shock. Thus, the question of which partner can enjoy such a benefit is important to an understanding of the mechanisms and consequences of equity partnership dynamics. A bargaining power might, for example, address the following question: unequal bargaining power between partners might confer a strong negotiation power only to one partner. Thus, the partner advantaged in bargaining power might more likely exercise options. This is probably one of multiple explanations, however. The partners' heterogeneous resources might also be important; for example, significant difference in partners' complementary assets to the focal partnership might create a divergence of option value, thus facilitating only one partner to exercise the options (Chi, 2000). Also, managers' attentions to the process of screening, selecting, and abandoning options could influence option exercise decisions (Barnett, 2008). Further, partners' difference in absorptive capacity might be an influential factor (Chi & Seth, forthcoming). There has yet been scant theoretical understanding of factors facilitating a particular partner to exercise options. More importantly, no empirical studies have examined this question, suggesting a need for further studies.

Research Question 2. How is the option writer compensated? The baseline framework suggests that, at the option exercise stage, a partner who acquires (divests) equity stakes upon

favorable (unfavorable) environment shock does *not* exercise its call (put) options. Rather, it should be understand that the partner plays a role as option writer and simply honors the option holder's decision (*Lemma 3*). Although this is probably the most reasonable interpretation, there is no reason that the honoring partner cannot appropriate enhanced (deteriorated) option values. This possibility relates to the ambiguities summarized in Table 1. First, unlike finance options, latent options are not proprietary (Folta & Miller, 2002). Second, strike (exercise) price in real options, P in Equation (1), is not specified *ex ante* unless an explicit option clause specifies it (Reuer & Tong, 2007). Thus, very likely, the honoring partner can appropriate some values through negotiations at the exercise stage even though it plays the role of option writer. For example, in the case of Wal-Mart's additional equity purchases in the joint venture in Mexico, shareholders of Cifra, local partner of this joint venture, enjoyed the significantly high acquisition premiums. Cifra played the role of option writer, as Wal-Mart intended to purchase additional equity stakes given the improving Mexican business environment. Cifra was compensated through the premiums. This example suggests that the significance of acquisition premiums at the option exercise stage is worthy of examination in future research.

Research Question 3. How would be the case understood under endogenous uncertainty? Finally, it should be noted that this study focused on external environment uncertainty, or market demand, not on internal environment uncertainty. In the presence of internal uncertainty, the theoretical implication could be different than in the case of the external environmental uncertainty. For example, under information asymmetry, one internal uncertainty is that a partner could sometimes misrepresent itself to the other partner (Balakrishnan & Koza, 1993). The resolution of information asymmetry in such cases means that only one partner could obtain more information about its counterpart (e.g. the counterpart's true value which was

misrepresented). Thus, such resolution does not equally reduce uncertainties encompassing both partners. Suppose that each partner in a dual equity partnership holds both latent and call and put options even when internal uncertainty is more prevalent than external uncertainty. When the internal uncertainty is resolved in this case, does only the partner who has been disadvantaged in information exercise its option? Future studies should incorporate uncertainty on both sides of the partnership.

CONCLUSION

Although the real option view has gained popularity in the management literature, researchers have scarcely addressed the ambiguities of its fundamental logic as a metaphor imported "as is" from finance options. The metaphoric use of real options should be carefully compared with finance options and modified to apply to management reality. Focusing on equity partnerships, this article emphasizes "dual latent options and dual partner roles" as a baseline framework. Further, upon an external environment shock, the asymmetric nature of partners' roles in option exercise is salient. The study contributes to the literature by suggesting how the real options view could be improved toward a "theory" of management.

Table 1-1. Comparison of Finance Options with Real Options in Management

Attribute	Financial Options	Equity Partnerships	Market Entry Decision	Investment in Multiple Nations	Venture Capital Investment
Ex Post Negotiation	No	Yes	Not appropriate	Not appropriate	Yes
Role	Who is option holder/writer is specified *ex ante*.	Ambiguous	Obvious	Obvious	Specified
Type of Options	What option held, is specified *ex ante*.	Ambiguous (Call or/and Put)	Obvious (Deferral or Growth)	Obvious (Switching)	Specified (Call and Put)
Proprietary Nature	Yes	Not always	No	Yes	Not always
Cost to Purchase/Hold Options	Reflected in option premium	Mixed with control premium	Opportunity costs emerge	Coordination costs emerge	Hands-on could be costly
Cost to Strike Options	Specified as "strike price" *ex ante*	Ambiguous	Latecomer disadvantages (for Deferral)	Switching costs	Negotiation with board is costly

Table 1-2. Studies of Real Options in Equity Partnerships

Study	Research Type	Key Focus	Option Type	Implicit Assumption of Partners' Role
Chi & McGuire (1990)	Conceptual	Market entry mode and structuring of EP	Call option & Put option	Only one partner plays as a holder
Kogut (1991)	Conceptual & Empirical	Termination of EP by acquisition	Call option only	Ambiguous
Folta (1998)	Empirical	Choice between equity collaboration and outright acquisition	Call option only	Only one partner plays as a holder
Reuer & Leiblein (2000)	Empirical	Impact of multi-nationality and international EP on down side risk	Switching option & Call option	Only one partner plays as a holder
Chi (2000)	Conceptual	Option values in EP, each partner's valuation, explicit option clause	Call option & Put option	Two partners can play as holder/writer
Chi & Seth (2002)	Conceptual	Influence of divergence in partners' valuation to option values	Call option & Put option	Two partners can play as holder/writer
Folta & Miller (2002)	Empirical	Additional equity purchase in EP	Call option only	Only one partner plays as a holder
Tong & Reuer (2005)	Empirical	Explicit option clause to acquire	Call Option	Not Appropriate
Kumar (2006)	Empirical	Value creation by EP partner buyout or EP divestiture	Call option & Put option	Only one partner plays as a holder
Tong, Peng, & Reuer (2008)	Empirical	Impact of international EP on firms' growth option values	Call option only	Only one partner plays as a holder
Chi & Seth (forthcoming)	Conceptual	Influence of complement capabilities to option values in EP	Call option & Put option	Two partners can play as holder/writer

Ⅲ. ESSAY 2:
A Perceptual Capability View of Real Options:
Equity Acquisition/Divestment in International Equity Partnerships

ABSTRACT

Extant works applying the real options view to equity partnerships have not incorporated the general observation that, in two-partner equity partnerships, both partners could hold both call and put options *ex ante*. This omission leaves a fundamental puzzle unexplored: When a favorable (unfavorable) market shock emerges, which of the two partners really acquires (divests) the equity stake? The present study introduces organizations' perceptual capabilities as a key contingency to address this puzzle. Focusing on the context of international equity partnerships, it hypothesizes that equity shifts from a local partner to a foreign partner (i.e. equity acquisition by a foreign partner as well as equity divestment by a local partner) are negatively associated with the host country's market shock, while this relationship is inversely moderated by the foreign partner's prior investment experience. The empirical analysis provided results supportive of the hypotheses. Moving away from the current metaphoric use of real options in management, this study is a step toward understanding how real options may differ from financial options in subtle yet fundamental ways.

INTRODUCTION

The real options view has gained popularity among scholars as a means to understand equity partnerships (Li, James, Madhavan, and Mahoney, 2007, for a review).[2,3] It emphasizes the value created by employing equity partnerships as a transitory investment structure toward acquisition or divestment in the presence of uncertainty. The contribution of real options view to the broad alliance/partnership literature has three important facets: first, it provides an alterative explanation of firms' motivation to enter equity partnerships, complementing conventional

[2] In this study, equity partnerships are defined to include joint ventures, which are legally independently established firms invested in by two firms; and equity alliances, where cooperative contracts are supplemented by equity investments by one partner in the other partner.
[3] Further, this study focuses on the two-partners partnership.

theories such as transaction cost economics (e.g., Oxley, 1997), resource based-view (e.g., Eisenhardt & Schoonhoven, 1996), and so on. Second, it emphasizes the value residing in equity partnerships under the presence of uncertainty, while other management theories tend to see uncertainty as a risk. Finally, it accounts for overtime change of ownership structure in equity partnerships. It thus serves to bridging equity partnerships and corporate acquisitions/divestments, each of which had been understood as a distinct form of corporate governance.

The main logic of the real options view to explain equity partnerships is structured as follows: by forming equity alliances under uncertainty, partners defer their full commitment to acquisition (call option) or defer their full commitment to divestment (put option). As the partnership's true value eventually proves worthy of acquiring or divesting, the partner additionally acquires remaining equity stakes in the partnership (call option exercise) or sells its remaining equity stakes to the counterpart (put option exercise). Accordingly, one important concern in this rationale resides in factors that trigger equity partners' option exercise decisions. Kogut (1991), the seminal work in this stream of literature, relates call option exercise decision with the market "shock" as a signal of improved opportunities: when a favorable market shock (e.g. unexpected market demand growth) emerges, the potential acquirer's expected valuation of the partnership might exceed a threshold in its baseline forecast. That partner then purchases additional equity stakes from its counterpart. Kogut found in his empirical analysis that an equity partnership termination by acquisition was *positively* associated with market movement, which supports his argument. Since the publication of this study, scholars have empirically examined factors to influence option exercise decisions in equity partnerships, although they have provided

mixed results regarding applicability of real options rationale (Folta & Miller, 2002; Kumar, 2005; Warner, Fairbank & Steensma, 2006).

Despite the increasing volume of research, there remains an unsolved puzzle at the heart of the real option rationale in equity partnerships, in particular regarding partners' decision making in the exercise of an option: *what conditions enable a particular equity partner, between the two, to exercise its call by acquisition (exercise its put option by divestment) upon positive (negative) market shock?* When the market improves, for example, both partners may appreciate the businesses' enhanced value of partnership assets (Reuer & Tong, 2007). Accordingly, both partners might seek to exercise their call options by acquiring additional equity stakes from their counterpart. Yet only one partner can really increase its equity share, and we don't know which partner does so. Similarly, both partners have potential incentives to exercise put options (divestment of their own stake to the alliance partner) when the market demonstrates negative shock. However, only one partner can really divest its equity share to the counterpart. This is a fundamental question left in the literature: how can we precisely understand the real options rationale in equity acquisition/divestment between equity partners? Extant works have scarcely addressed this question. While Kogut (1991) suggests that a call option exercise reflects termination of equity acquisition, for example, he does not address the issue of which partner, between the two, acquires its counterpart's equity and which divests its equity to the counterpart. Similarly, the following studies appear to assume that only one partner can exercise options (Folta & Miller, 2002; Kumar, 2005). The present study seeks to address this fundamental question that the existing literature has largely avoided.

This study suggests that extant studies have neglected the above question probably for the following two reasons: First, extant studies have not incorporated the definition that equity

partnerships should involve *at least two partners,* except for a few conceptual works (Chi, 2000; Chi & Seth, 2002, Chi & Seth, forthcoming).[4] As argued above, for example, Kogut (1991) sees an equity partnership itself as a unit of analysis, and thus neglects the interrelationship between the two partners. Similarly, Folta and Miller (2002) focus on call option exercise decisions by firms investing in minority investments, but do not incorporate the possibility that those firms' counterparts might also have options. Kumar (2005) examined whether equity acquisition or divestment between partners create values, but regarded each acquisition or divestment as a distinctive event. In other words, it is not reflected that an equity shift between two partners reflects acquisition for one partner and divestment for the other. Consequently, the unit of analysis in equity acquisition/divestment tends to be either the partnership itself or only one partner, rather than the relational unit of two partners (Dyer & Singh, 1998).

Second, the extant studies have rarely examined the real options logic by incorporating a possibility that one equity partner holds both call and put options *ex ante*. Equity partnerships might serve not only as call options but also as put options, i.e. options for future divestment (Amram & Kulatilata, 1999; Chi, 2000; Chi & Seth, 2002; Kumar, 2005). Thus, if we apply the logic suggested by Kogut (1991), one could expect that the exercise of put option would occur when *unfavorable* market shock emerges and the partner's valuation of the partnership falls below their baseline forecast. Interestingly, however, Kogut (1991) argues that when a business environment turns out unfavorably, "(N)o further investment is made. Nor is it necessary to divest their assets (if operating cost is low), for there is the possibility that change will be more favorable. It is for this reason that the downside risk is not consequential (22)." It is proposed that this assertion would hold only when one (or two) partner(s) had call options but did not have put options. Consequently, the present study departs from the extant works with the observation

[4] This study focuses on equity partnership involving two partners, i.e. two parent firms.

that, between two equity partners, both partners in general have both call and put options *ex ante* (Chi & Seth, 2002). One may attribute mixed results in the extant empirical research to a paucity of understanding of ambiguities in real options in equity partnerships (e.g. Folta & Miller, 2002; Kumar, 2005).

To address the above puzzle, the present study suggests that the organizational capability to perceive external environments serves as an important contingency. Organizations often hold different degrees of capability to perceive the external environments (Milliken, 1987; 1990). Accordingly, even given the same level of market shock, the degree of precision with which an organization can understand environmental change and thus reduce its perceptual uncertainty differs among organizations. This study suggests that the partner who can more significantly reduce its perceptual uncertainty will exercise an option aligned with the direction of the market shock. By extending this logic to international equity partnerships, one can hypothesize how a foreign partner's equity purchase (which coincides with local partner's equity divestment) is influenced by environment shock. Regression analysis with longitudinal dataset of international equity partnerships in the automotive component industry provides support for these hypotheses.

The present study contributes to the literature by extending prior studies in two important ways. First, by incorporating dual-partners & dual-options views, it suggests that real options logic involves more ambiguities than does finance options logic, regarding both the role of decision maker and the types of options. Real options may be embedded in any types of equity alliances when those alliances provide flexibility for future decisions in a contingent fashion. [5]

[5] Equity alliance contracts sometimes involve explicit option clauses that can limit ex post negotiation among partners (Tong & Reuer, 2005; Vaossolo et al. 2004). In the contract, firms stipulate the clause that only one partner has a right to acquire its partner's equity stake (or divest its own equity stake) at a specified price in the future. At the same time, contracts in equity partnerships often leave room for the partners to negotiate ex post (Chi & Seth, 2002). There exists a sound reason that explicit options may be of little importance in equity partnerships: most equity partnership contracts do not contain an explicit

Under a latent option logic, nothing binds partners' *ex post* behavior. In contrast, in finance options, it is specified *ex ante* who holds options (option holder) and what option he/she holds. Despite such a critical difference between real and finance options, considerable attention has been paid to filling the gap. This research is probably the first to empirically test equity acquisition/divestment decisions by incorporating the ambiguity. Second, this study introduces perceptual capability as an important contingency to address ambiguities of real options. Put simply, the real option is the perspective of uncertainty. Thus, how decision makers perceive and understand uncertainty should influence their decisions. In sum, this study will contribute as an initial step to developing the current form of a real options view, which is somewhat metaphoric of finance options, toward the management "theory".

THEORY & HYPOTHESES

Review of Real Option Exercises in Equity Partnerships

Recent work on real options has provided rich insights, highlighting its relevance to dynamics of equity partnerships. To firms, real options confer the opportunity to respond to future events in a contingent fashion (Bowman & Hurry, 1993; Kogut & Kulatilaka, 2001). The main logic of *call options* in equity partnership involves two stages: inception stage and exercise stage (Folta, 1998). At the inception of partnerships, by investing in a partial equity stake of a partnership rather than fully acquiring a target, a firm obtains call options to buy out its partner in the future. This means that the firm is conferred the right but not the obligation to undertake the

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option clause but rather leave it up to partners to decide, through ex post negotiation, whether, when, and who can acquire the other's stake (Kogut, 1991; Chi & Seth, 2002). Reuer & Tong (2005) calculated the percentage of international joint ventures with explicit option clauses, out of their sample from the SDC database, and found the figure to be only about 1%. Moreover, even with explicit option clauses, partners can renegotiate their contracts after the inception. For example, they could revise the contract or even terminate it through ex post negotiations (Reuer & Arino, 2002). Unless the cost of negotiating such an acquisition or divestment ex post is prohibitively high, equity partners in general have latent options. In sum, the latent options can reside in most equity partnerships, and this essentially allows partners to ex post negotiate directly.

specified action (i.e., additional equity purchase) in the future (Bowman & Hurry, 1993; McGrath, 1997). Sequentially, firms can decide whether they want to *exercise* the call option by buying additional equity stakes of the other partner. Exercise of the call option will be triggered only when the difference in the value of underlying assets from the value of holding the option exceeds the option exercise price (Folta & Miller, 2002). Thus, variables relevant to underlying assets and option values influence the decision making of a call option exercise.

This study focuses on the two important variables: (1) the value of underlying assets residing in a partnership, and (2) uncertainty of the asset value in a partnership. The condition under which a partner exercises its call option is expressed as follows;

$$S - C(S, \sigma) > P \qquad (1)$$

where S corresponds to the value of an underlying partnership; C denotes the value of holding options, which is a function of S and σ; σ is the uncertainty of the partnership value; and P is the exercise price. First, the Equation (1) suggests that the value of the focal partnership would increase the likelihood of call option exercise. Kogut (1991) argues that changes in the value of assets depend on the stochastic process determining the current value of embedded options. Thus, the market value is an important variable influencing the asset value of a partnership. Further, market cues informing managerial decision are oriented toward identifying biases in the interpretation of market information. Accordingly, individuals in partnerships base their acquisition decision on deviation of the market value from their baseline forecast. When market cues signal a rise in market valuation relative to their baseline forecasts, decision makers realize a rise in the value of assets in the partnership and thus exercise call options by acquiring additional equity stakes from the other partner. Accordingly, the positive market deviation from its baseline trend would facilitate acquisition decision. Second, the *mitigation* of uncertainty

regarding the partnership value would increase the likelihood of a call option exercise. Greater uncertainty increases delay in irreversible investment decisions (McDonald & Siegel, 1986). In contrast, if decision makers realize that uncertainty has decreased, and they find the options to be "in the money", they will then exercise their call options. In sum, the likelihood of a call option exercise by equity acquisition (1) increases with the positive deviation of market cue from the baseline trend and/or (2) decreases with the degree of uncertainty.

The *put option* logic is also valid in the real option literature (Amram & Kukatilata, 1999; Chi, 2000; Kumar, 2005). The put option is a firm's right, but not obligation, to wholly divest the asset in the future. Under high environmental uncertainties, by forming equity partnerships, a firm defers its commitment to a full divestment of the venture. Once the decision makers confirm that the holding ventures are worthless, they can sell out their remaining equity stakes of ventures to the other partner. Thus, equity partnerships as put options help firms reduce the risk of regret at up-side environmental change while retaining the flexibility of divestment at the downside environment change. Similarly to the call options logic, the market deviation from the long-term trend and/or the degree of uncertainty influence the decision of a put option exercise. When the market cue falls significantly below the long term trend, such a negative market shock decreases the value of underlying asset, thus making prompting decision makers to exercise their put options by divesting their equity stakes. When the uncertainty is mitigated and the value of underlying asset becomes not worth holding, they would then exercise their put option. In sum, the likelihood of a put option exercise by an equity divestment (3) increases with *negative* deviation of market cue from the baseline trend, and/or (4) decreases with degree of uncertainty.

It should be emphasized here, again, that the above logic does not address which partner, between the two, really exercises its call options in the event of positive deviation from the

market trend, or which exercises its put options upon negative deviation from the market trend. This is because, as argued above, most prior works have not explicitly incorporated the possibility that each of the two partners has both call and put options. As far as two partners who hold two options (Chi, 2000; Chi & Seth, 2002), both partners could have chances to appropriate values by acquiring or divesting equity stakes in the emergence of market shock. Under positive market shock (positive deviation from baseline trend), both partners might seek to acquire each other's equity stakes. Under negative market shock, both partners would seek to divest their equity stakes to their counterpart. Therefore, a key question is which partner can exercise an option that is aligned with the direction of market shock. Now, I turn to discussing organizational capabilities as a key contingency to address this question.

Influence of Perceptual Capability

There could be multiple potential contingencies to determine which partner exercises an option aligned with the direction of market shock. For example, unequal bargaining power between partners might confer a strong negotiation power only to one partner. Further, a difference between partners' complementary assets to the focal partnership might create a divergence of option value, thus facilitating only one partner to exercise the options (Chi, 2000). Among several potential contingencies, this article introduces a partner's perceptual capability to interpret environments as a key catalyst. For organizations to be viable, new information on the environments must be obtained, filtered, and processed. How organizations interpret the state of the environment is critical to their decisions and subsequent actions. Accordingly, scholars have developed a large number of models to describe the process by which organizations, or managers, interpret the environment (Cowan, 1986, Dutton & Duncan, 1987; Kiesler & Sproull, 1982; Lyles & Mitroff, 1980). In particular, Daft & Weick (1984) indentified three key

interpretation processes, i.e. scanning the environment, interpreting collected information, and learning though taking an action. These processes often entail complexity as they involve uncertainties. Milliken (1987, 1990) disentangles this complexity by dividing uncertainties into three types and articulating them in reference to Daft and Weick's interpretation processes. First, scanning process entails the environmental state uncertainty, which represents a firm's inability to forecast industry or market events. The interpretation process entails the organizational effect uncertainty, representing an inability to predict the effect of any given environment state or event on one's own firm. Finally, learning process entails the decision response uncertainty, representing an inability to predict the consequence of a firm's specific decision.

Milliken (1987, 1990) further reasons that, given the same environmental state uncertainty, degrees of the perceived organizational effect uncertainty and the perceived strategic response uncertainty could differ from that of the environmental state uncertainty. Whereas the environmental state uncertainty results from the state of external environment (e.g. volatility of market demand), the latter two uncertainties derive from organizations' lack of capabilities, or skills and knowledge, and their ignorance in making decisions to interpret the environment (Miller & Shamsie, 1999). Consequently, organizations could hold heterogeneous capabilities to perceive/interpret environment change even under the same environment change: while they face the same degree of environment change (say, ten-percent of market growth), how they interpret the effects of the environment change on their organizations and the consequence of their strategic responses would differ, depending on their capabilities.

I apply the above rationale to the option exercise decision in equity partnerships: even under the upward shift in a market growth (positive shock) which is consistent for both partners, if a partner is less capable than its counterpart of interpreting how persistent this positive shift

will be, then this partner will not perceive reduced uncertainties. The perceptual capability is important since it addresses why the same market shock does not always reduce the partners' uncertainties to the same extent. The deviation of market cue from the baseline trend (market shock) is arguably the same for both partners. For instance, ten-percent market growth is interpreted by both partners as the market's growing by ten-percent. However, firms vary in their capabilities to identify potential value in partnerships (Dyer & Singh, 1998). Thus, the degree of influence they perceive such market shock to have on the value of the partnership is not consistent between partners. The difference comes from their capabilities to precisely perceive and understand consequences of the market shock (Miller & Shamsie, 1999). Organizations that have greater perceptual capabilities can better reduce the uncertainty of the asset value of a partnership.

Suppose that positive market shock ($dM > 0$) increases the value of underlying business (S), which might facilitate a call option exercise. However, *positive market shock itself does not always decrease uncertainty*. Rather, the market shock might increase the perceptual uncertainty as decision makers might perceive more turbulence in the value of the underlying asset. The above argument is summarized below:

$$S - C\,[S(M),\ \sigma(M)] > P \qquad (2)$$

$$\text{where } \partial S/\partial M > 0,\ \partial\sigma/\partial M > 0 \text{ or } <0 \qquad (3)$$

Therefore, under positive market shock ($dM>0$), if it results in increased perceptual uncertainty ($\partial\sigma/\partial M > 0$), an organization would not be able to exercise its call options as it still faces non-trivial uncertainties. However, if a firm holds more capabilities to exactly assess the environmental change than does the other partner, it will be better able to perceive whether the positive external environmental shift will have a persistently positive impact on the value of the

partnership asset ($\partial\sigma/\partial M < 0$). When it sees a higher persistent value in the partnership asset with a smaller degree of uncertainty, it will more likely exercise its call option than will the other partner. Similarly, under negative market shock, a partner who has more capability and can thus more certainly perceive persistent reduction of the partnership asset value will exercise its put options. The other partner cannot exercise its put option as it still perceives a high degree of uncertainty.

Equity Acquisition and/or Divestment in International Equity Partnerships

In order to draw testable hypotheses from the above argument, this study focuses on equity partnerships in the international context for two reasons. First, uncertainties are magnified in the international setting as compared with the domestic setting (Reuer & Tong, 2005). Second, in the setting of international equity partnerships, the asymmetric characteristics between the partners are salient: an international equity partnership in general involves both a foreign partner and a local partner.

The perceptual capability argument implies that, in the context of international equity partnerships, a foreign partner has a fundamental disadvantage over its local partner (Hymer, 1976; Makino & Beamish, 1998). Since a local partner is incumbent in the host country by definition, it knows the business environment of the host country better than does its foreign partner (Inkpen & Beamish, 1997). For example, the local partner is more likely to have richer and more extensive information-gathering networks in the host market, as well as the "thick" contextual knowledge necessary for accurately interpreting the signals received through those networks. In contrast, a foreign partner will find it more difficult to access such information and networks. The previous literature defines such fundamental disadvantages entailing foreign partners as "liability of foreigness" (Barkema & Vermulen, 1998; Zaheer, 1995; Zaheer &

Masakowski, 1997). Thus, upon shock of the host market, a foreign partner, due to its limited capability as compared to that of the local partner, can less precisely interpret the impact of that shock on the partnership and the consequence of the organization's strategic response. In Milliken's (1987; 1990) framework, under the same degree of change in environmental state uncertainties, foreign partners face more organizational effect uncertainties and more decision response uncertainties. Therefore, even when the local partner initiates option exercise upon host market shock, the foreign partner still cannot initiate exercise because it faces non-trivial uncertainties. Consequently, I contend that, in an international equity partnership, a local partner will more likely exercise its call (put) option upon positive (negative) market shock than a foreign partner, all else being equal. The left side of Table 1 summarizes the relationships described above. Upon favorable market shock, although both foreign and local partners have opportunities to exercise call options to appropriate the increased value of the partnership, the local partner is more likely to claim the right to exercise call options. Thus, equity share shifts from a foreign partner to a local partner (upper-left cell). Upon unfavorable market shock, equity share shifts from a local partner to a foreign partner as a local partner exercises its put options (lower-left cell).

When a foreign partner has prior international investment experiences, however, this disadvantage could be overturned. There is a widely held consensus in management theory that a firm's accumulation of experience in a new market reduces its exposure to the adverse effects of uncertainty in that market (Barkema, Shenkar, Vermeulen & Bell, 1997; Delioz & Heinz, 2003; Heinz & Delios, 2001; Pennings, Barkema & Douma, 1994). Experience in prior international activities helps a foreign partner to overcome its liability of foreigness (Barkema & Vermeulen, 1998; Zaheer, 1995; Zaheer & Masakowski, 1997). Specifically, prior experience in the host

country environments enhances a foreign partner's ability to sense and interpret signals of change in its present environment. For instance, a highly-experienced foreign partner may have already established local networks to better assess the information gathered through those networks. Greater international experience also allows a foreign partner to understand better, and more quickly, how its present local market fits into the strategic logic of its global position. Thus, it is asserted that, in an international equity partnership, when a foreign partner has more prior investment experience, a foreign partner will more likely exercise its call (put) option upon change in the favorable (unfavorable) market shock than will a local partner, all else being equal. The right side of Table 1 summarizes this relationship. The relationship observed for the *all else being equal* case is reversed when a foreign partner has the higher degree of international investment experience.

----------Insert Table2-1 about Here----------

This study focuses on hypotheses of equity shifts from a local partner to a foreign partner (lower-left cell and upper-right cell in Table 1) because the equity shift in the opposite direction is hard to obtain for the reason discussed below. First, Table 1 leads to an expectation that an equity shift from a foreign partner to a local partner is negatively related with market deviation from the long-term trend (lower-left cell). Conversely, it is positively related with market deviation from the long-term trend when the foreign partner is more experienced (upper-right cell). In other words, the relationship specified in Hypothesis 1 is inversely moderated by the extent of a foreign partner's experience in the host country. These relationships are captured in the following hypotheses:

Hypothesis1. *An equity shift from a local partner to a foreign partner is negatively associated with the deviation from the host country market trend.*

Hypothesis 2. *When a foreign partner has prior investment experience in the host country, an equity shift from a local partner to a foreign partner is positively associated with the deviation from the host country market trend.*

METHODOLOGY

Data

The sample of this study focuses on longitudinal change in equity share distribution in international equity partnerships initiated by Japanese automotive component manufacturers during the period 1986-2003. Limiting the sample to automotive component manufacturers, the number of automotive production units in host countries can be used as a measure of market demand, which is a more precise proxy to gauge market trend/deviation than are macro-economic measures such as GDP. In addition, the Japanese automotive component industry is suitable to this research as it experienced significant global expansion during the sample period (Chung, Mitchell & Yeung, 2003). Data on international equity partnerships were derived from *Kaigai Shinshutsu Kigyo Soran* (Japanese Overseas Investment, JOI hereafter), which is compiled by Toyo Keizai Shinpo-Sha, a Japanese publishing and database company. Using this database provides two advantages: First, the coverage of this database is comprehensive for Japanese firms' foreign investments (Beamish, Delios, & Lecraw, 1997). Second, change of

equity distribution in each international partnership over time is traced. The annual edition from 1986 to 2003 is used to construct a longitudinal profile of equity partnerships.

As noted, this study focuses on the equity shift from a local partner to a foreign partner. The equity shift from a foreign partner to a local partner was hard to obtain. In particular, for cases where a local partner acquires all of the foreign (Japanese) partner's remaining equity stakes at once, the observation disappears from the JOI database as this means that a foreign (Japanese) partner ceases its investment from the partnership. Consequently, the analysis of equity shift focuses only in one direction.

From all investments listed in the data source, dyadic equity partnerships were identified, including joint ventures and equity alliances, which involve one Japanese partner (foreign partner) and one local partner of the host country. Partnerships involving more than three partners, about 20% of all observations, were excluded from the research scope . Also excluded were all countries that have imposed some form of equity restrictions on equity partnerships for automotive-component manufacturers, as including such countries might lead to biased estimation results. The information regarding governmental equity restriction was obtained from the Japan Export Trade Organization (JETRO), a Japanese governmental agency in charge of the global business activities of Japanese firms. Based on this information, North American countries (the U.S. and Canada), European countries (U.K., France Germany, Italy, Netherlands, Belgium, Portugal, Sweden, Ireland, Switzerland, Finland, Hungary, Poland, Romania, Russia, Slovakia and Turkey), and Oceania countries (Australia and New Zealand) remained as reliable host countries that have not imposed strict restrictions since the late 1980's. Within this sampling frame, there were 1302 partner-year observations of 167 international equity partnerships which were invested in by 99 Japanese firms. Thus, in this sample, several Japanese parent firms (or

partners) entered multiple equity partnerships. The regression analyses were performed accounting for clustering of data.[6]

Model and Estimation Method

This study employs an event-history approach, consistent with prior works on option exercises in equity partnerships (Kogut, 1991; Folta & Miller, 2002). In particular, the Cox semi-parametric proportional hazard model was employed (Cox & Oaks, 1984). Since the Cox model assumes that the baseline hazard ratio is unknown, it is preferable over parametric methods in the many cases of event-history analyses where a specific theoretical distribution of time to event is unknown (Box-Steffensmeier & Jones, 2004). The Cox proportional hazards regression model takes the following form:

$$h_i(t) = h_0(t)\exp\sum\beta_i\{X_{ikt}(t)\},$$

where $h_0(t)$ is the baseline hazard function, $X_{ikt}(t)$ is the value of the kth covariate for firm i at time t, andβ_i is a vector of coefficients to be estimated.

Prior studies have employed different definitions of option exercise as an event. Kogut (1991) employs a complete termination of joint venture by acquisition as a measure of call option exercise. Folta and Miller (2002) employ two types of events, any additional equity acquisition by one partner, and a partner's majority equity stake acquisition (which raises the ownership level at least 50%). The former definition allows multiple events, in which a single partner in an equity partnership repeatedly purchases or sells off its equity stake during the entire observation period. In this study, a definition similar to that of Folta and Miller's (2002) was

[6] This study accounts for the potential unobservable correlations within a Japanese parent firm using the "cluster" option of STATA in the regression analyses. The results without cluster options were also conducted, and provided the mostly consistent results with those reported in the results section. Further, the supplemental regression analyses using a single, randomly-chosen partnership per Japanese firm yielded results consistent with the interpretation reported.

employed, i.e. any additional equity shift from a local to a foreign partner subsequent to the initial ownership distribution. First, the real options logic conceptually does not restrict option exercise event to the dissolution of partnership nor to majority acquisition. Any ownership distribution changes indicate additional resource commitment to a partnership by one partner and additional resource divestiture by the other partner, which is consistent with the real options logic. Second, majority acquisition is an equity purchase by a partner who holds minority ownership position at the initial equity distribution. Thus, in this case, the theoretical and empirical focuses are limited to the partner who initially holds minority ownership. This focus is one-sided in this study's theoretical context, however, as it suggests that both partners hold both options initially.

The dependent variable is dichotomous to capture equity shift from a local partner to a foreign partner in a given year. When a foreign partner increases its equity share at the same time as the local partner decreases the same amount of its equity stakes, this will regarded as the foreign partner's purchase of an equity stake sold by its local partner. Accordingly, the dependent variable is set as follows:

: 1 = Equity share shift from a local partner to a foreign partner in a partnership

: 0 = Otherwise

Key Independent Variables

Hypothesis 1 concerns whether market deviation from the trend influences additional equity share shifts from a local partner to a foreign partner. The independent variable thus needs to gauge market fluctuations that influence option values of the automotive component manufacturers' partnership in each host country. Consistent with Kogut (1991), an annual residual error from the long-term trend of market demand was employed. The market demand is

captured by the number of automotive units (sum of cars, trucks, and buses) produced in the host countries. This is the appropriate measure because the automotive components manufacturers' business market is well harmonized with the volume of automotive assemblers' productions as they mostly vend their products to assemblers in the same country. [7] The residual error is estimated as follows:

$$R_{t,j} = PU_{t,j} - (\alpha_j + \beta_j t)$$

Where PU_{tj} is the number of automotive units produced in each host country j in year t., α and β are the intercept and regression coefficient, respectively. This residual error model assumes that decision makers in automotive component manufacturers establish a long term base-rate of automotive production units produced in the country and look at year-to-year departures from this trend. In this study, a ten-year window to estimate a long-term base rate was employed.[8] The data from *Kaigai Jidousha Tokei* (Statistics of Foreign Automotive Market) compiled by the Japanese Automobile Manufacturing Association were used. A negative sign for this variable is expected for Hypothesis 1.

Hypothesis 2 refers to the moderating impact of foreign partners' host country investment experience on the relationship between the market deviation from the trend and equity shift. To capture this, an interaction term of foreign partners' investment experience and the market deviation described above was created. There are two main measures for the experience construct: time-based and count-based measures (Martin & Salomon, 2003). Time-based measures center on the extent to which a firm gains an accurate understanding of the host country while count-based measures focus on the opportunity to develop routines related to experience transfer. Our "experience" construct is conceptually close to the former as a partner

[7] The author interviewed experts of the Japanese automotive industry and confirmed that the number of produced automotive units is the appropriate measure for their market.
[8] The author confirmed with the industry experts that 10 years is the appropriate time window.

mitigates uncertainty by introspectively learning from its previous international business experiences. Thus, to gauge Japanese (foreign) partner's host country investment experience, the number of years from the foreign partner's first establishment of an affiliate in a focal host country to the observation year was used. The data were obtained from JOI. The centered experience and external environment shift variables were multiplied to create the interaction term. A positive sign is expected for the interaction term.

Control Variables

Several control variables were included to account for factors that potentially influence the dependent variable both at the partnership/partners level and at the country level. As for the partnership/partners level, first, the ownership structure of partnerships was controlled. For example, partners with majority ownership may be advantaged particularly in the negotiation with their counterparts because holding majority ownership provides strong shareholder voting power. Second, the mode of equity partnership was controlled, i.e. whether it's an independently formed joint venture or an equity alliance. Gulati and Singh (1998) argue, for instance, that joint ventures and equity alliance provide varying levels of hierarchical control in a partnership, with joint ventures incorporating more hierarchical elements than minority investments. Such differences could have influence over negotiation power and managerial decision making on acquisition or divestment decision. Accordingly, a dummy variable was constructed to capture the entry mode where a partnership formed as equity alliance investment is coded 1 and an alliance as a newly formed joint venture is coded 0. Third, size of the partnership was controlled, using the number of employees to gauge partnership size. Because some partnerships lack information about the number of employees for all observation years, the average of the available data for the number of employees was computed and was included in the model as a

time-invariant variable. Fourth, the size of a foreign partner was included in a similar manner. This variable is included because a larger partner might enjoy greater bargaining power over its counterpart. Fifth, whether the local partner's core business is related with its foreign partner's was controlled. When the core businesses differ between partners, they might hold heterogeneous resources, which potentially influence their valuation difference of the partnership (Chi, 2000). Through industry journals, on-line databases (e.g., EDGAR), annual reports, and a variety of internet sources, the information on local firms' business descriptions was obtained .Whether the local's core business description is related with a foreign partner's core business, i.e. automotive component manufacturing, was coded as follows: (related = 1, unrelated =0). Finally, an attempt was made to control Japanese business group (keiretsu) effects on Japanese (foreign) partners' managerial decisions. Each Japanese partner's keiretsu affiliation was identified, using the information from *Nippon no Kigyo-Group* (Japanese Business Group) compiled by Toyo Keizai Shinpo-sha. The dummy variables for the three main business group affiliations were included (Toyota group, Honda group, Nissan group, = 1, respectively, and 0, otherwise).

As for the country-level controls, first, the exchange rate change was included. The economics literature accepts that the exchange rate affects a firm's decision to invest in a foreign country (Bayoumi & Lippworth, 1998). The annual exchange rate change of each host country's currency over Japanese Yen was calculated. The data were obtained form *the World Development Indicators* compiled by the World Bank and *the International Financial Statistics* by IMF. Second, the cultural distance between each host country and Japan is included to control a possibility that degree of distance influences uncertainties that are not captured by the market demand. The Hofsted's indices were employed and the calculation method suggested by

Kogut & Singh (1998) was followed. Furthermore, dummy variables were included for each host country, coded 0 for the United States as the base country and 1 for other countries. Finally, the dummy variables for inception years of partnerships were included to control unobservable time effects.

RESULTS

Table 2-2 shows the descriptive statistics and correlations. The variance inflation factor (VIF) analysis provides the VIF from 1.01 to 1.31 for variables, comfortably below the rule-of-thumb threshold of 10 used to assess multicollinearity in regression models (Neter, Wasserman & Kumar, 1985). Therefore, multicollinearity is not a serious concern in the empirical models.

Table 2-3 summarizes the regression results of the Cox proportional hazard model. Model 1 includes the control variables only. Model 2 includes the market deviation. Model 3 adds the interaction term of foreign partners' experience and the market deviation. The market deviation variable has negative coefficients with statistical significance in both Model 2 and Model 3 ($p<.1$, $p<.05$, respectively). The significant and negative coefficient suggests that the equity shift from a local partner to a foreign partner is positively associated with the deviation from the host country's market trend. The results support Hypothesis 1. The interaction term in Model 3 has a significantly positive coefficient ($p<.05$). A negative coefficient suggests that an equity shift from a local partner to a foreign partner is negatively associated with the market deviation when a foreign partner has greater experience with the host country investments, supporting Hypothesis 2. Figure 2-1 demonstrates the relationship between multiplier of equity shift with the market deviation at different levels of a foreign partner's experience, which was estimated from coefficients in Model 3. When the experience is at the mean level, the multiplier increases as external environment shift decreases, which is consistent with the Hypothesis 1.

When the experience is higher than the average by a standard deviation, however, the inverse relationship is observed. The multiplier increases along with upward environment shift. In contrast, when the experience is lower than the average by a standard deviation, the downward-sloping line of the multiplier and the market deviation is steepened. The result confirms Hypothesis 2.

It is also useful to note the results of control variables. First, the foreign partners' experience has a significantly positive coefficient. Thus, the experienced partner shows a tendency to increase its equity share. Also, the size of the foreign partner increases its likelihood to purchase the local counterpart's equity stakes. The variable of local partner's core business has a negative coefficient, which suggests that a foreign partner tends to acquire the local counterpart's equity share when the foreign partner and local partner's businesses are unrelated. Finally, exchange rate of the host country has a negative coefficient. This suggests that equity shifts from local partner to foreign partner when the host country's market appreciates.

----------Insert Table 2-2 about Here----------

----------Insert Table 2-3 about Here----------

----------Insert Figure 2-1 about Here----------

Additional Analyses

Additional analyses were also performed to explore the results further. First, although this analysis focuses on a foreign partner's prior investment experience in the host country, other kinds of foreign partner's experiences are worthy examining. Accordingly, first, the host country experience variable was replaced with a foreign partner's prior investment experience in *any*

foreign countries. Specifically, the number of years was constructed from the foreign partner's first establishment of an affiliate in a foreign country to the observation year. Then the variable was interacted with the market residual variable. There was a significant positive prediction of equity shift by the interaction (p. < .05). Second, the variable of a foreign partner's prior experience of international equity partnerships was constructed in a similar manner, and then interaction with the market deviation was examined. Again, there was a significant positive prediction of equity shift by the interaction (p. < .05). In sum, the moderating effect of experience holds not only for the host country experiences, but for the other types of experiences as well, i.e., experience in foreign investments and experience in international equity partnerships. Indeed, the correlations of the host country experience with the other two variables were high (0.465 for international investment experience, 0.382 for international partnership experience).

Further, although there was no explicit hypothesis, the bargaining power reflected in ownership structure might influence the decision of an exercise when market shock emerges. The interaction term of the market deviation and the equity share of a foreign partner were included. However, there was no significant prediction of equity shift by the interaction (p = .98). Thus, the bargaining power reflected in the ownership structure did not influence equity shift between partners.[9]

[9] Although this study does not examine the equity shift from a foreign to a local partner, I attempted to examine the regression with an incomplete sample. As discussed above, the sample from JOI does not allow distinction between a local partner's full acquisition of all of a foreign partner's remaining equity stakes and a dissolution of partnership. I could identify observations of when a local partner acquires a part of the foreign partner's remaining equity stakes. In our sample, eleven events are identified. I used these events as a dependent variable, and regressed it on the variables suggested for our main analysis. The results indicate that the influence of market shock on partial equity shift from a foreign to a local partner is negative and statistically significant (p. < .05). This counters my expectation summarized in the upper left cell in Table 1. As for the interaction term of host country's experience and market deviation, however, I obtained a negative and significant coefficient (p. < .1). In other words, when a foreign partner

DISCUSSION

Contributions

The real options view has become impactful in the broad alliance and management literatures as it suggests the value residing in flexibility by forming equity partnerships as well as explains for a dynamic ownership structure change between partners. In the management literature on real options, at the same time, yawning theoretical gaps between options in finance and real options in management emerge as an important concern (Folta & Miller, 2002; Reuer & Tong, 2007). One direction to address the gaps is to set theoretical boundaries in which real options logic works or does not work (Adner & Levinthal, 2004; Cuypers & Martin, 2008). The other direction, which this article follows, is to clarify ambiguities in real options logic in a specific context, thus making it more applicable to actual management decisions. As one of the initial attempts for this purpose, this study points out the ambiguity stemming from the specific roles of each partner in equity partnerships and the type of option held by each. Based on the dual partners and dual options view, this study proposes that the application of real option logic to equity partnerships needs a clear understanding of which partner can exercise an option that is aligned with market shock. The paper introduced the idea that organizational capability to perceive the external environment might serve as a key contingency. The empirical test supports the hypotheses developed relating to equity acquisition/divestment in international equity partnerships. Equity shift from a local to a foreign partner is negatively rather than positively associated with host market shock. When the foreign partner has more global experience, however, equity shift from local to foreign partner takes place upon positive host market shock.

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has more host country investment experience, unfavorable market shock facilitates purchase of a foreign partner's equity by a local partner. This result is consistent with the expectation summarized in the lower right cell in Table 1. Again, the results should be interpreted cautiously due to incomplete data.

Consequently, this study contributes to filling a gap in the understanding of real options, which have so far been analogically applied from the finance perspective of options.

Further, applying a multi-partner view, this study goes beyond Kogut's (1991) conclusion. Kogut (1991) argues that a partner terminates a joint venture by buying out its partner's equity stake *only* when the business environment turns out favorably. If a business environment turns out unfavorably, in contrast, "(N)o further investment is made. Nor is it necessary for a partner to divest its assets (if operating cost is low), for there is the possibility that change will be more favorable. It is for this reason that the downside risk is not consequential (22)." The present study implies, however, that this reasoning can be improved by employing a multi-partner view: equity acquisition takes place even under unfavorable environment change when the counterpart exercises its put option.

This study also makes a contribution to the real option literature in the broad management framework, by suggesting the importance of cognitive aspects (Cuypers & Martin, 2007). Miller (2002) has combined cognitive issues with real options, contending that real options are bound by the spatial and time myopia of managers. Barnett (2008) suggests that managers' attentions in an organization influence the process of screening, selecting, and abandoning options. Complementing their works, this study suggests that cognitive interpretations of uncertainty have an impact on option exercise initiation. Simply put, real options theory is a theory of uncertainties. However, uncertainties are always perceived by decision makers and need to be articulated with their strategic decisions. This is a point of critical difference between financial options theory and real option theory in management. Therefore, understanding the relationship between real options and cognitive issues in management contexts is important.

This point also involves a managerial implication. This study finds that capability difference, perhaps even more than ownership structure, is a key to initiate for option exercise. Indeed, the empirical analysis found that ownership structure did not influence option exercise initiation while partners' capabilities did. Therefore, managers involved in equity partnerships need to seriously consider the advantages of a superior (compared to their partner's) capability to exactly assess environmental uncertainties.

Inference of Asymmetric Exercise

One intriguing issue in the theoretical development is the role of a partner who does *not* exercise options that are aligned with the direction of the market shock. This study suggests that a partner who actually sells its equity stakes to the purchasing counter upon positive market shock does not exercise its call options because it has less perceptual capability and thus faces no reduction of uncertainty. If so, could we interpret that the selling partner exercises its put option? It should be inferred that the selling partner, upon favorable market shock, does *not* exercise the put option, but simply honors the purchasing party's call option exercise—i.e., the selling partner is acting as the writer of the buying partner's call option contract. Presumably, the selling partner could have attempted to exercise the call option as the external environment shifts favorably, but gave up its exercise chances simply because its benefit from realizing capital gains by selling its equity stake exceeds the cost of holding equity stakes and the cost of exercising the call options. This holds for the opposite direction as well. When one partner sells its equity stakes and the other party acquires them upon unfavorable market shock, both partners could have incentives to exercise put options. Therefore, a partner actually selling its equity stakes does exercise put option whereas a partner actually purchasing them is playing the role of writer of the options contract. In sum, the relationship between one partner's acquiring the other partner's

equity stakes and selling its own equity stakes is not symmetric in the sense of the two partners exercising call and put options, respectively. It is important to confirm that this is just an inference from our theoretical discussion because latent put options and call options are not observable. However, under the logic of dual partner & dual options view, this is probably the best inference.

Limitations and Future Tasks

It should be noted that the study involves several limitations. First, this empirical study examines only one direction of equity shift between partners: from a local partner to a foreign partner. However, based on the dual latent options logic, two additional hypotheses on equity shift from a foreign partner to a local partner can be drawn which could not be tested directly because data on equity shift from a foreign partner to a local partner were not fully available. A richer data set would enable us to test both directions of equity shift simultaneously. Also, the sample employed for the empirical study was limited to international equity partnerships invested in by Japanese automotive component manufacturers. Although limiting the empirical boundary is beneficial for controlling inter-industry differences, it would necessarily entail potential problems for generalization. Finally, it should be noted that this study focused on external environment uncertainty, or market demand, not on international environment uncertainty. *External environment uncertainty* (or exogenous uncertainty) is an uncertainty which a firm's action cannot influence (Roberts & Weitzman, 1981; Folta, 1998).[10] In contrast, *internal environment uncertainty* (endogenous uncertainty) could be influenced by the firm's specific actions. In the latter case, the theoretical implication could be different from the case of external environment uncertainty. For example, under conditions of information asymmetry, one

[10] This paper defines that "external" and "exogenous" are the same concepts, as are "internal" and "endogenous." Prior studies often employ "exogenous" and "endogenous" while this article uses "external" and "internal" as I believe the terms provide a more intuitive sense.

internal uncertainty is that a partner could sometimes misrepresent itself to the other partner (Balakrishnan & Koza, 1993). The resolution of information asymmetry in such cases means that only one partner could obtain more information about its counterpart (e.g. the counterpart's true value which was misrepresented). Thus, such a resolution does not equally reduce uncertainties encompassing both partners. Although disentangling interrelationship of option exercise between two partners under internal uncertainties is intriguing, this issue is left for future studies.

Table 2-1. Relationship between Equity Shift and Market Deviation from Trend

	All else being equal	When a foreign partner is experienced
Positive Market Movement	Local partner buys (exercises its call option) Equity shift Foreign → Local	H2. Foreign partner buys (exercises its call option) Equity shift Local → Foreign
Negative Market Movement	H1. Local partner sells (exercises its put option) Equity shift Local → Foreign	Foreign partner sells (exercises its call option) Equity shifts Foreign → Local

Table 2-2. Descriptive Statistics and Correlation Matrix

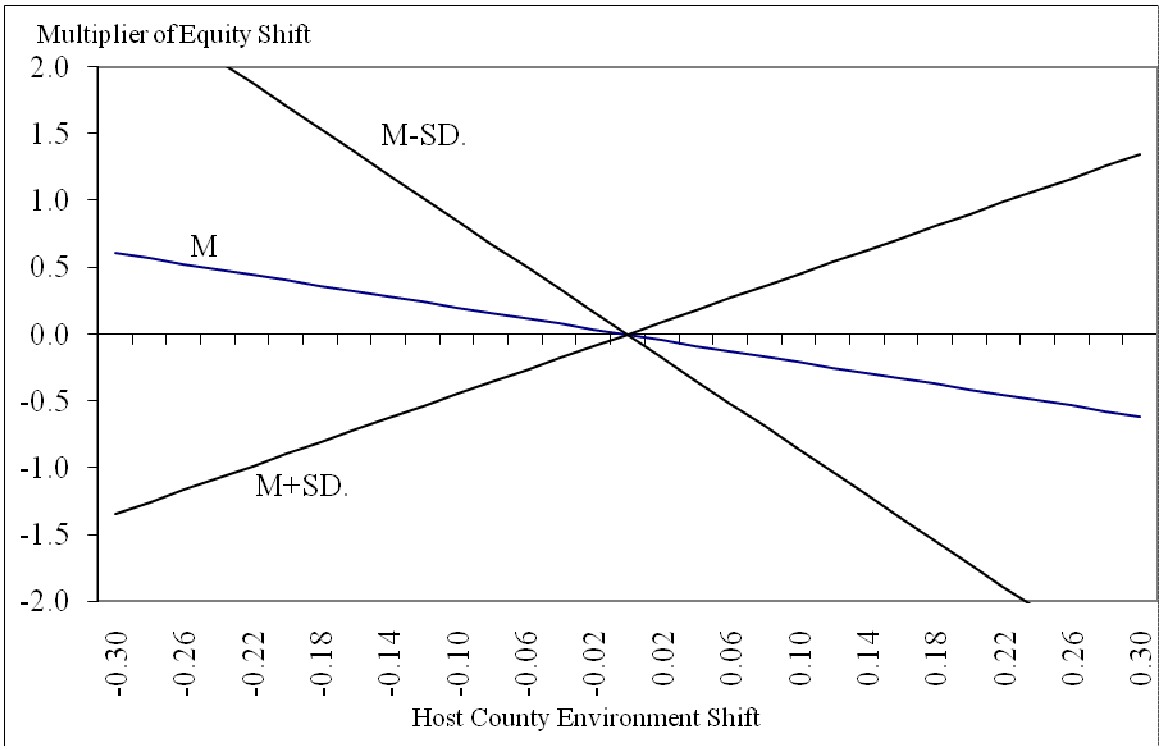
	Mean	SD	<1>	<2>	<3>	<4>	<5>	<6>	<7>	<8>
<1> Ownership Share of Foreign Partner	50.457	16.975								
<2> Entry Mode	0.039	0.193	0.226 ***							
<3> Size of Partnership	536.29	1410.49	0.098 ***	0.089 ***						
<4> Size of Foreign Partner	4473.69	7411.00	0.010	0.064 **	0.045 *					
<5> Core Business of Local Partner	0.911	0.284	-0.102 ***	0.016	-0.036 †	0.021				
<6> Exchange Rate	0.045	0.180	0.002	-0.014	0.043 *	0.002	-0.178 ***			
<7> Cultural Diffeence	2.462	0.797	-0.021	0.087 ***	-0.035	-0.039 †	0.163 ***	-0.168 ***		
<8> Experience of Foreign Partner	12.039	9.635	0.022	-0.090 ***	0.156 ***	0.114 ***	0.017	-0.131 ***	0.074 ***	
<9> Deviation from Market Trend	0.018	0.382	0.068 **	-0.022	0.023	-0.005	0.007	0.029	-0.111 ***	-0.065 **

1) N = 1302
2) †, *, **, and *** denote significance at the 10% level, 5% level, 1% level, and 0.1% level, respectively.
3) “S.D.” denotes standard deviation.

Table 2-3. Regression Results

	<1>	<2>	<3>
Ownership Share of Foreign Partner	-0.0087 0.0094	-0.0082 0.0091	-0.0082 0.0092
Entry Mode	1.7620 ** 3.7226	1.7552 ** 3.5292	1.8291 ** 3.7298
Size of Partnership	0.0790 0.0598	0.0800 0.0583	0.0870 0.0579
Size of Foreign Partner	-0.0269 † 0.0143	-0.0288 † 0.0151	-0.0290 † 0.0152
Core Business of Local Partner	-0.8732 * 0.1493	-0.8422 * 0.1493	-0.9083 * 0.1414
Exchange Rate	-2.0953 * 0.1057	-1.8157 * 0.1338	-2.1054 * 0.1012
Cultural Difference	0.2655 0.3757	0.0859 0.3234	0.2526 0.3807
Year Effect?	Yes	Yes	Yes
Host Country Effect?	Yes	Yes	Yes
Business Group Effect?	Yes	Yes	Yes
Experience of Foreign Partner	0.5147 *** 0.1653	0.5122 *** 0.1616	0.5447 *** 0.1587
Deviation from Market Trend	----- -----	-1.305 † 0.213	-2.044 * 0.119
Deviation from Market Trend × Experience of Foreign Partner	----- -----	----- -----	0.677 * 0.679
$\chi 2$	296.05 ***	317.57 ***	353.12 ***
$\Delta\chi 2$	-----	21.52 ***	35.55 ***
Log-likelihood, L(β)	-384.71	-377.55	-375.53
2[L(βi)-L(βbaseline)]	-----	14.31 ***	4.04 *

1):†, *, **, and *** denote significance at the 10% level, 5% level, 1% level, and 0.1% level, respectively.
2) The upper number of each cell indicates coefficient. The lower number indicates standard error.
3) Coefficients and standard deviations of size of partnership and size of foreign partner are multiplied by 1000 for a viewability.



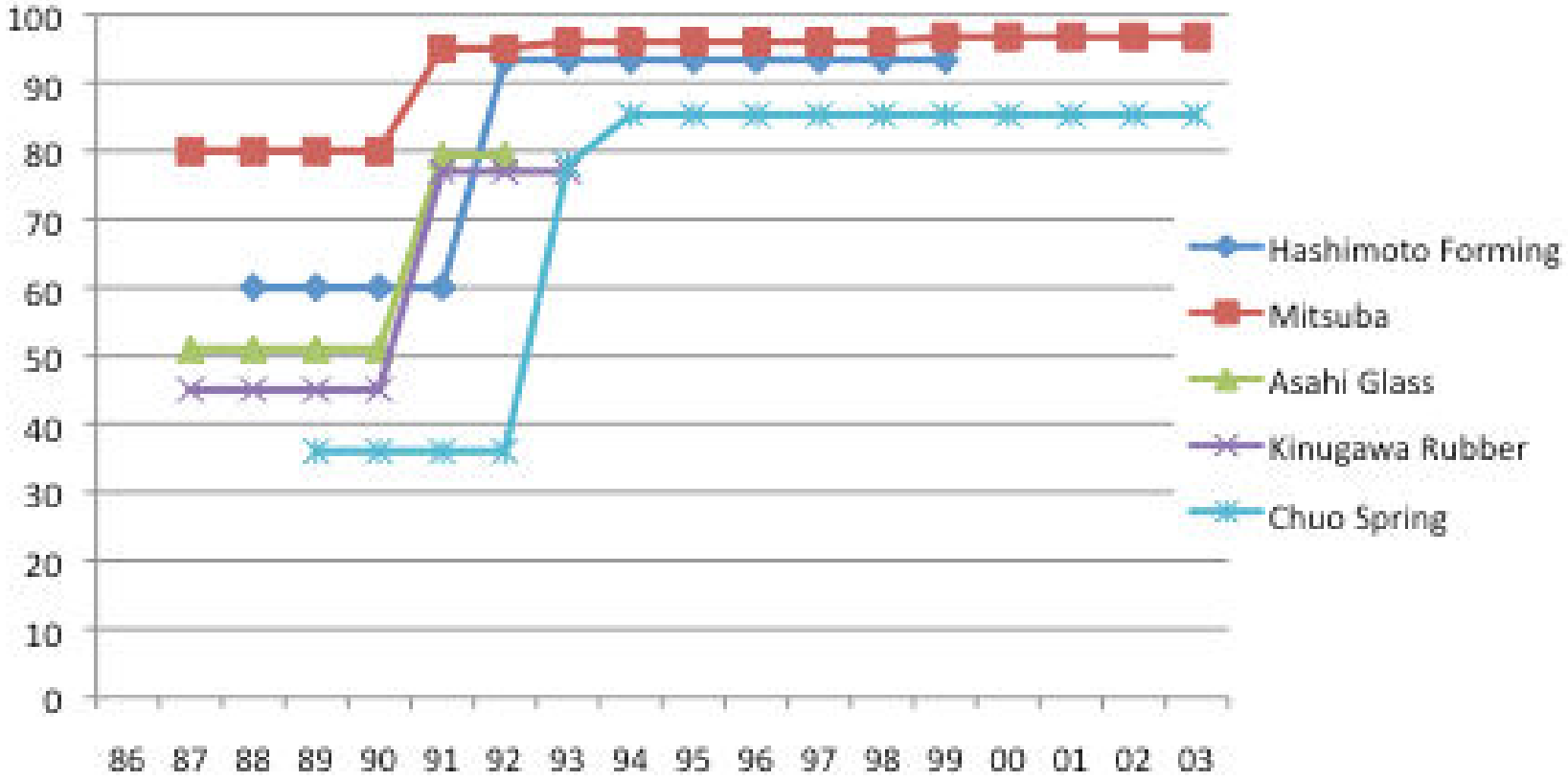
"M" denotes the mean of foreign partners' experience. "SD" denotes standard deviation.

Figure 2-1. Effect of Host Country Market Deviation from Baseline Trend on Equity Shift at Different Levels of Foreign Partner's Experience

APPENDIX

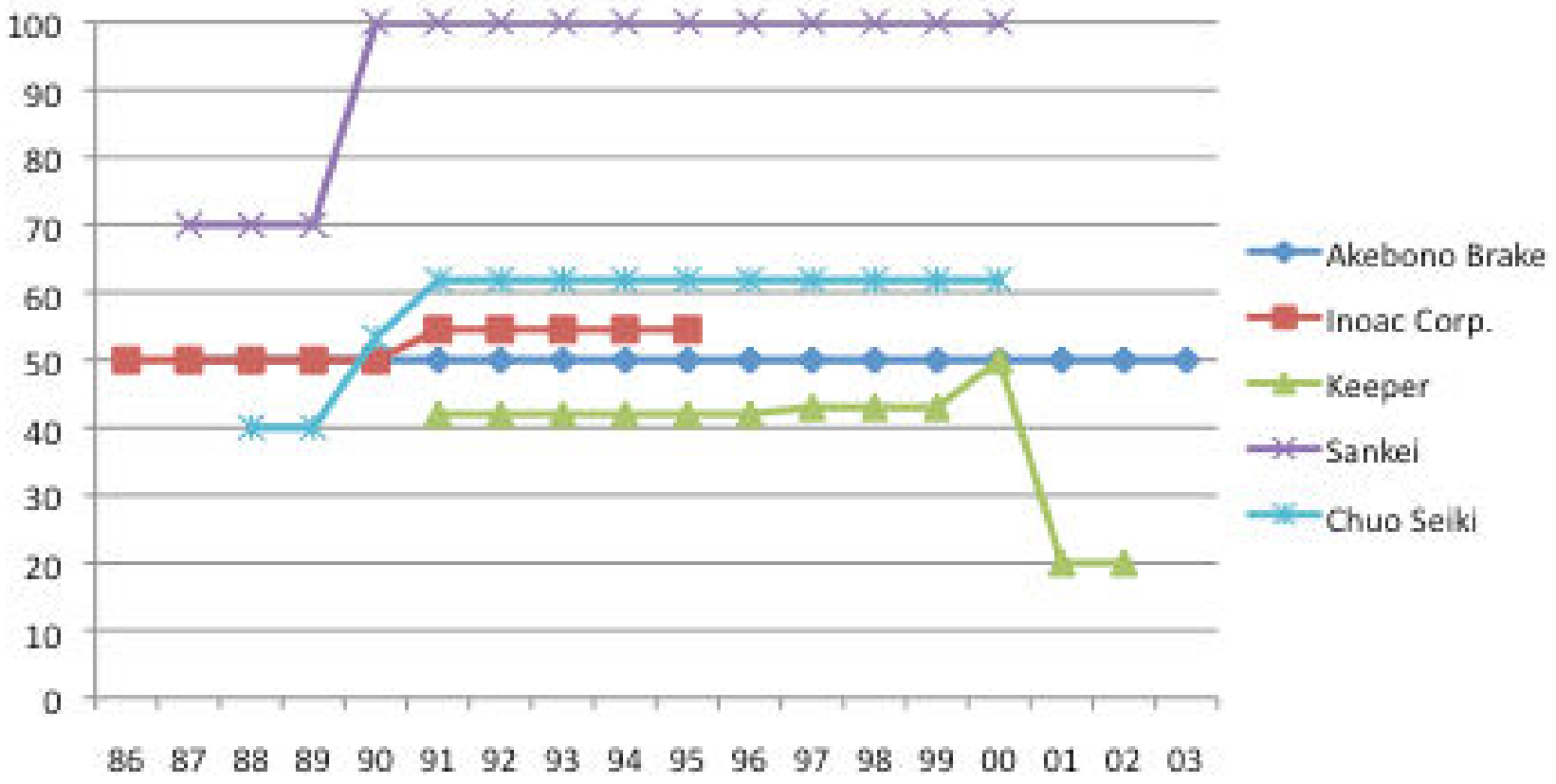
Figure A1 – A5. Overtime Change of Foreign (Japanese) Partner's Equity Share in Selected International Equity Partnerships (IEPs)

Figure A6 – A9. Residual Error of Number of Automotive Production Units in Host Country



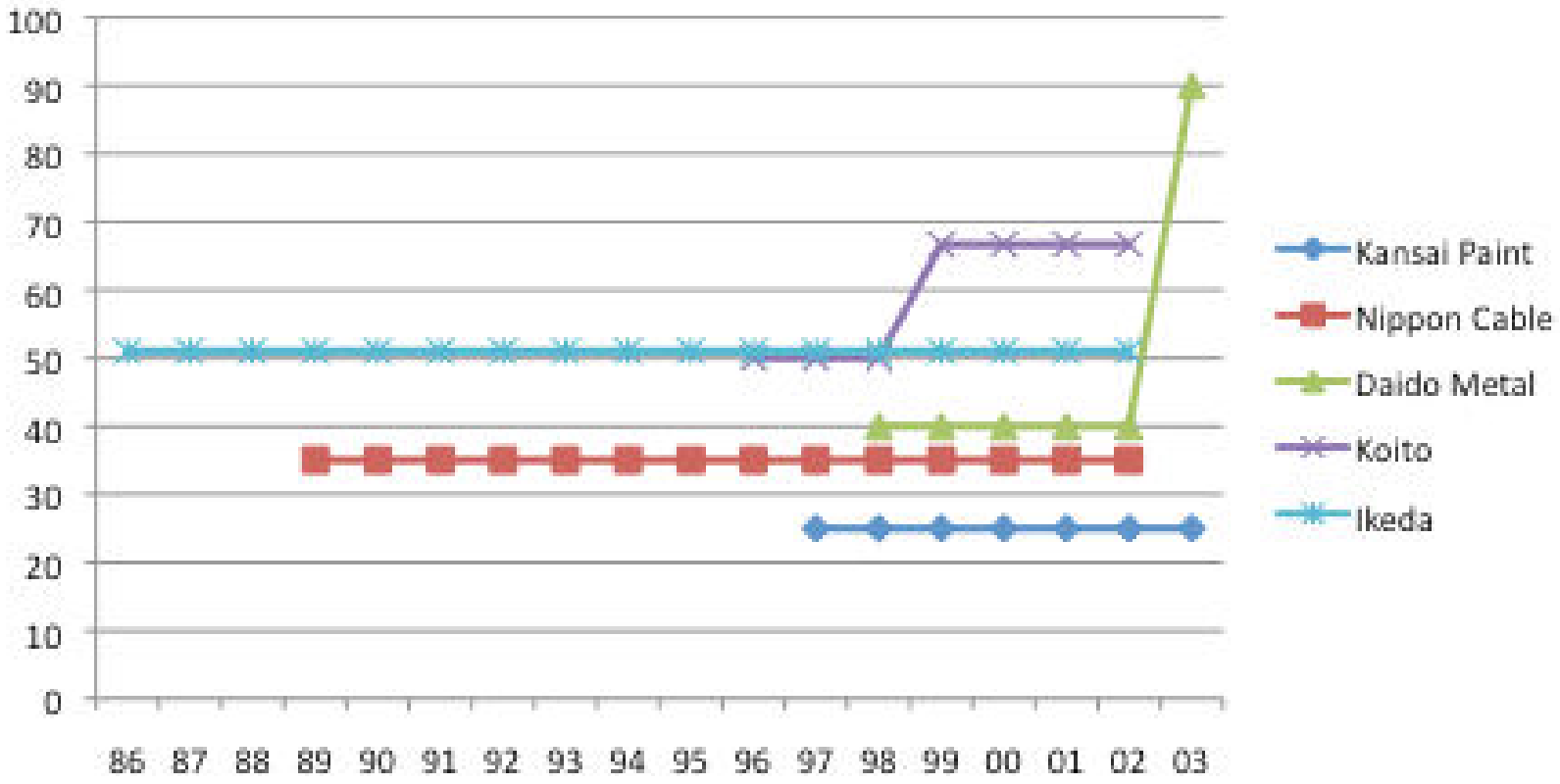
Vertical axis: Foreign partner's equity share
Horizontal axis: Year

Figure A-1. Overtime Change of Foreign (Japanese) Partner's Equity Share in Selected IEPs
Host Country: United States (1)



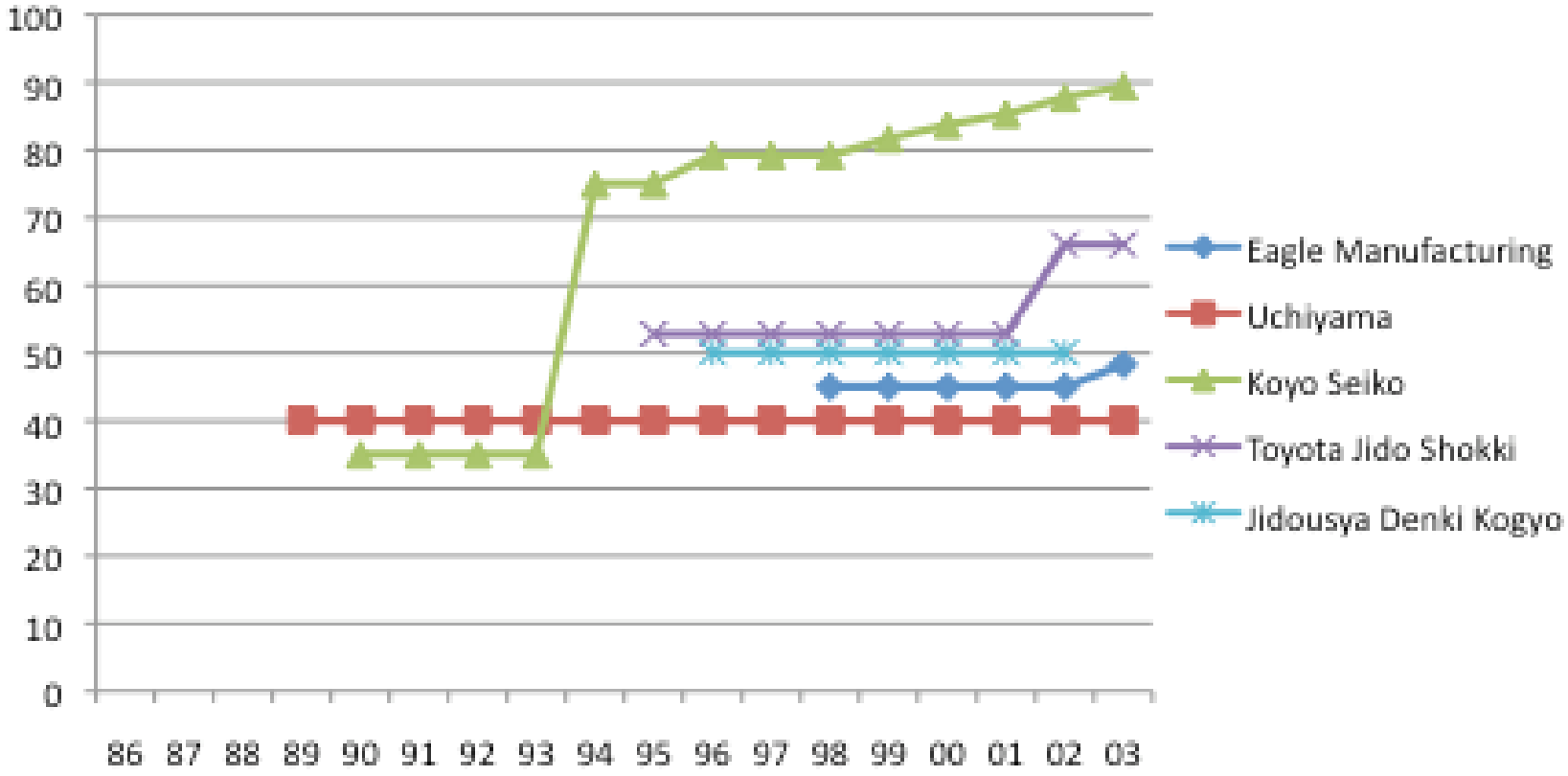
Vertical axis: Foreign partner's equity share
Horizontal axis: Year

Figure A-2. Overtime Change of Foreign (Japanese) Partner's Equity Share in Selected IEPs
Host Country: United States (2)



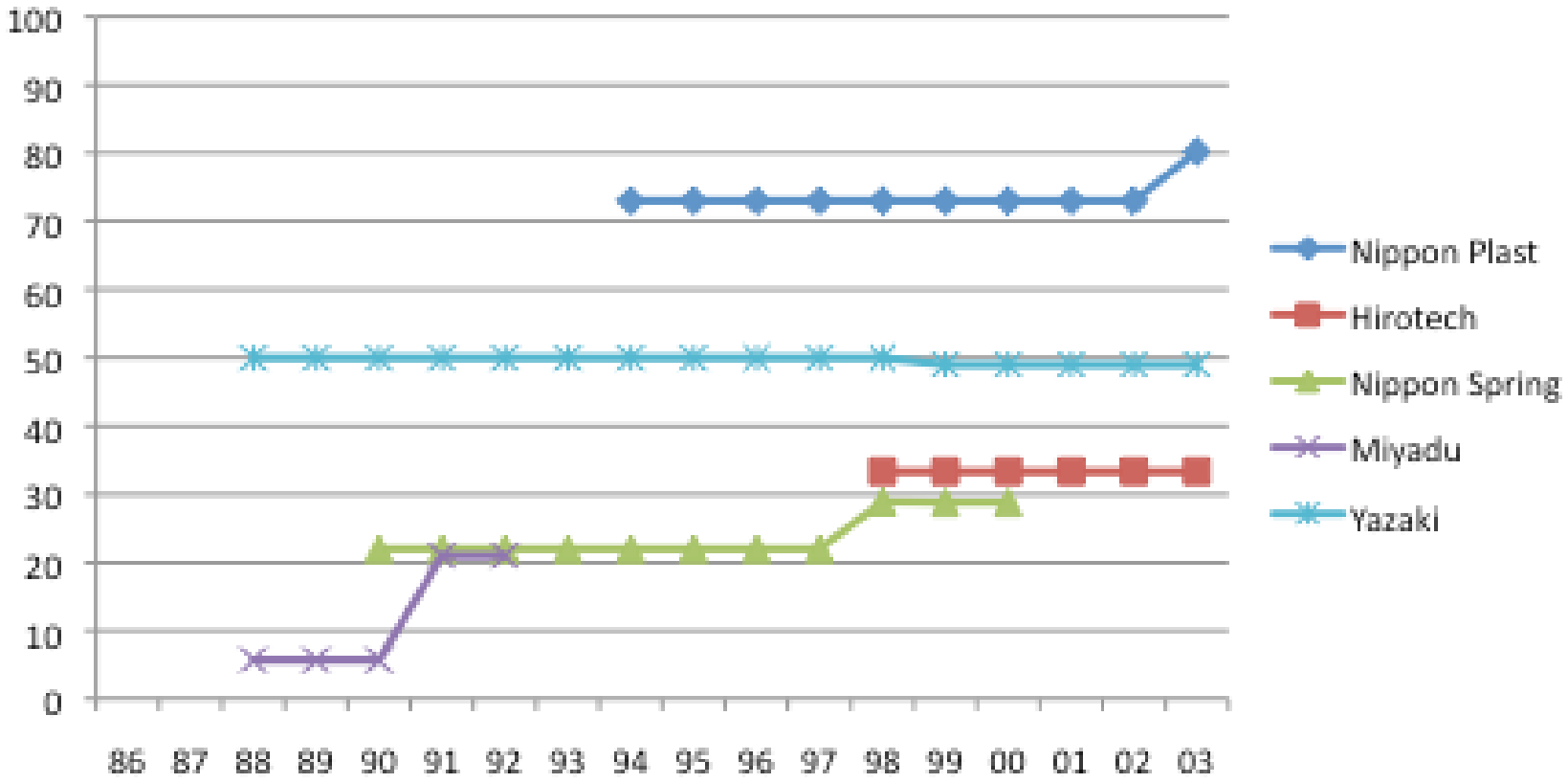
Vertical axis: Foreign partner's equity share
Horizontal axis: Year

Figure A-3. Overtime Change of Foreign (Japanese) Partner's Equity Share in Selected IEPs
Host Country: United Kingdom



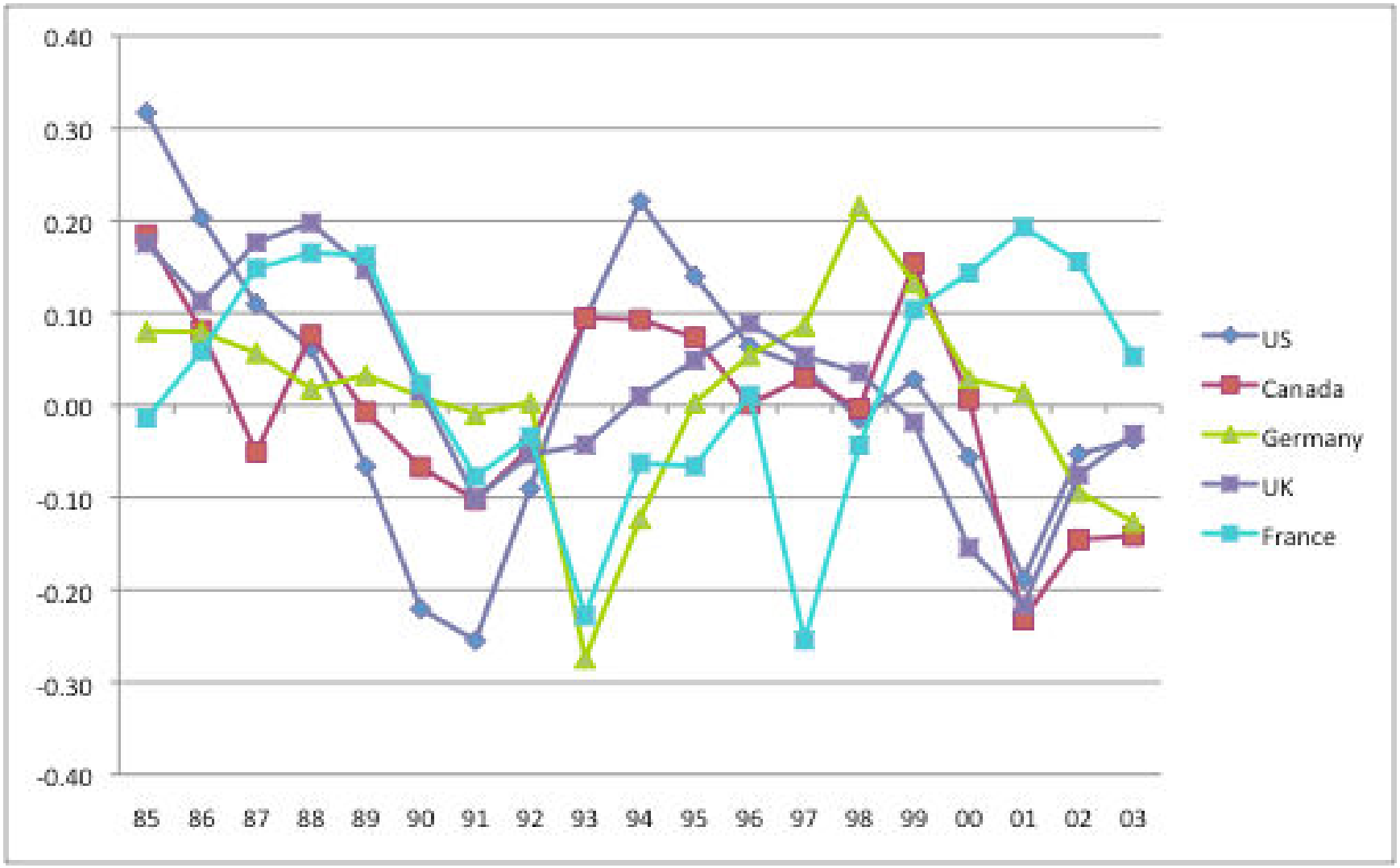
Vertical axis: Foreign partner's equity share
Horizontal axis: Year

Figure A-4. Overtime Change of Foreign (Japanese) Partner's Equity Share in Selected IEPs
Host Country: France



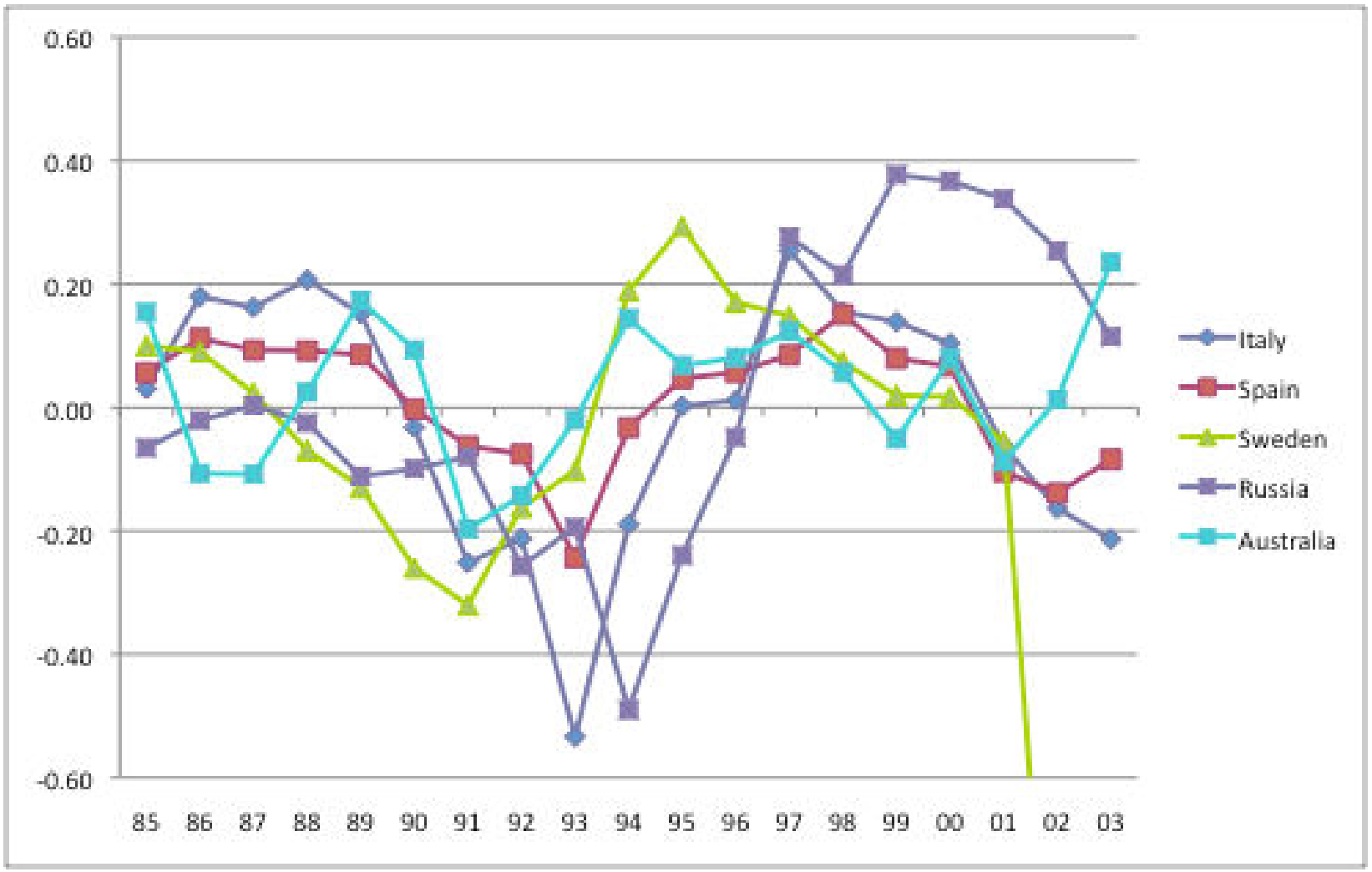
Vertical axis: Foreign partner's equity share
Horizontal axis: Year

Figure A-5. Overtime Change of Foreign (Japanese) Partner's Equity Share in Selected IEPs
Host Country: Mexico



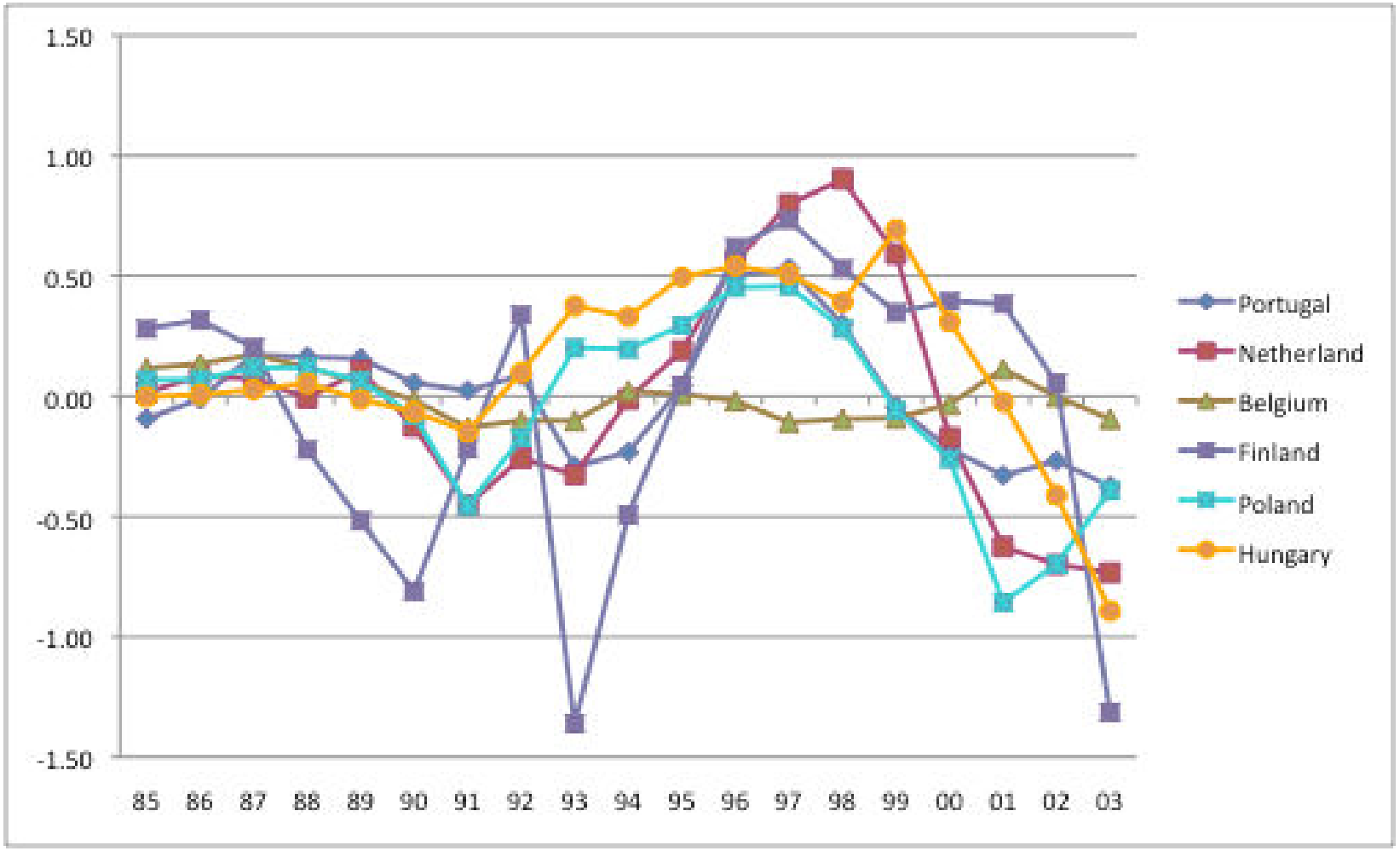
Vertical axis: Residual error
Horizontal axis: Year

Figure A-6. Residual Error of Number of Automotive Production Units in Host Country (1)



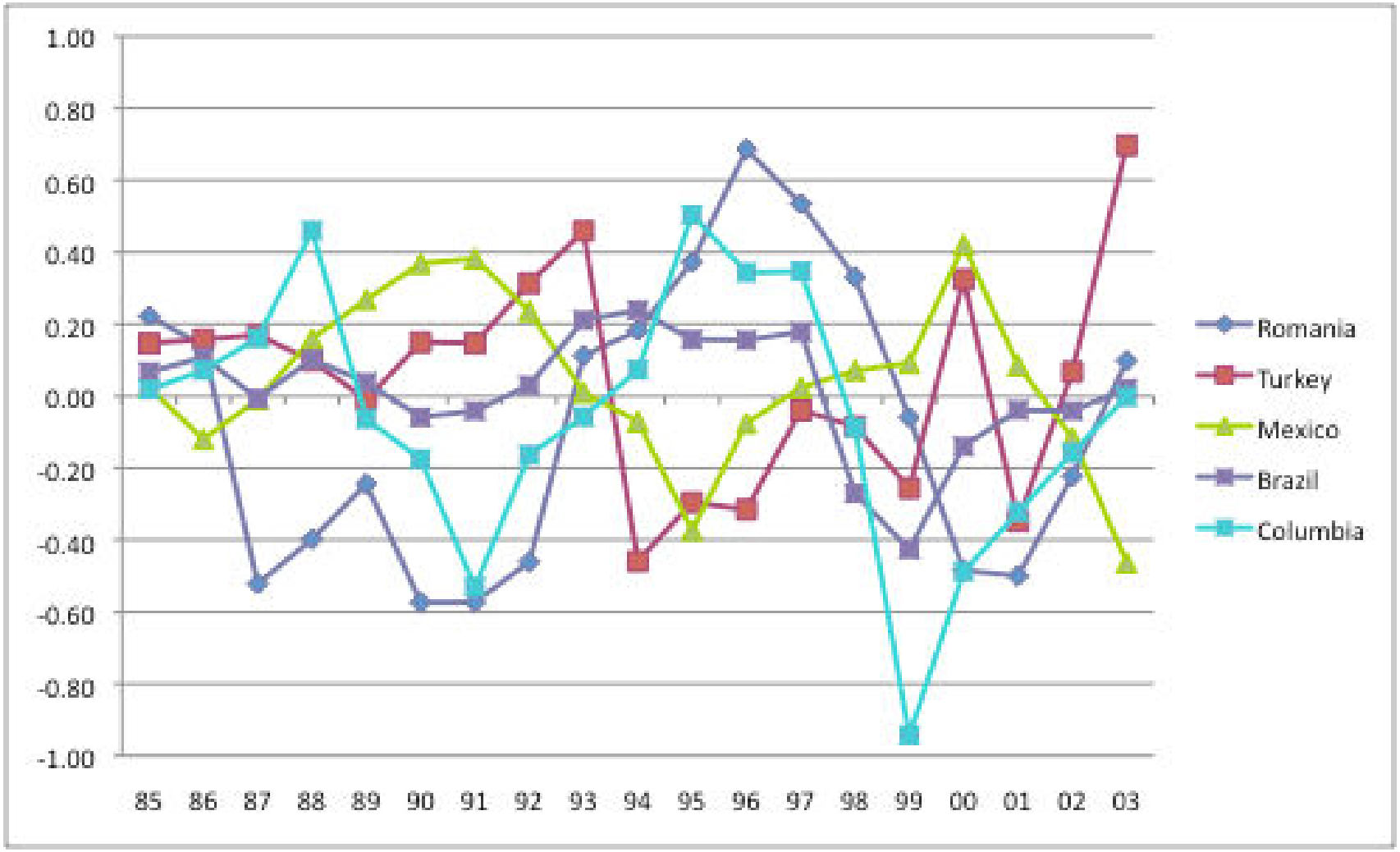
Vertical axis: Residual error
Horizontal axis: Year

Figure A-7. Residual Error of Number of Automotive Production Units in Host Country (2)



Vertical axis: Residual error
Horizontal axis: Year

Figure A-8. Residual Error of Number of Automotive Production Units in Host Country (3)



Vertical axis: Residual error
Horizontal axis: Year

Figure A-9. Residual Error of Number of Automotive Production Units in Host Country (4)

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